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Influence of Flavomycin on Performance and Egg Quality of Laying Hens

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Abstract

The present experiment was conducted to evaluate the effect of different levels of flavomycin on performance and egg quality of layer hens. Ninety commercial layer hens (White Lohmann) at the age of 63 weeks were used .The duration of the experiment was seven weeks. Birds were randomly assigned to three dietary treatment groups of thirty hens each. The treatments included 100 and 150 gm flavomycin/ton feed (8 and 12 ppm of flavophospholipol respectively). Each treatment was subdivided into six replicates of 5 birds each. All experimental diets were formulated according to the guidelines given in the manual provided by the breeder company Layers Performance and parameters of egg quality were recorded. The results indicated that the addition of flavomycin to diet significantly improved (P<0.05) egg weight values throughout the experimental period. No significant differences were observed in the performance of all treatment groups (feed intake and egg production) and egg quality. It is concluded that dietary supplementation with flavomycin, in inclusion rate of 8 ppm, enhanced egg production as well as egg weight of aged commercial laying chickens.

Keywords: *Flavomycin, Layer hens, Performance, Egg quality.*

1. Introduction

Although chickens are efficient converters of feed to gain, they cannot digest 15-25% of the feedstuffs they consume because the feed ingredients contain indigestible anti nutritional factors that may hinder digestion and/or remain indigestible to the endogenous enzymes present within the bird [1]. The laying birds require more energy for production of egg in addition to their body maintenance. The energy requirement varies on the rate of laying egg; hen that lays more eggs requires more energy as compared to hen that lays fewer eggs [2]. It is well known that the overall goal of the chicken industry is to achieve the best performance, feed utilization and bird's health [3]. Accordingly, flavomycin, also known as flavophospholipol and bambermycin, has been used exclusively as an antimicrobial growth promoter in poultry production systems [4]. Flavomycin enhances the normal avian gut flora [5] and reduces the incidence of potential human and animal pathogens [6]. Flavomycin also improves the intestinal morphology, by increasing villus height and decreasing crypt depth, which reflected on enhancing nutrient absorption [7]. In addition, as a result of lack of absorption by gastro-intestinal tract of birds, flavomycin is quite safe to be administered without concerns about tissue residues. [8], [9].

This study aimed to evaluating the effect dietary supplementation of flavomycin on general performance and egg quality of laying hens.

2. Materials and Methods

2.1 Experimental site and duration

The study was conducted at the poultry production farm unit, College of Animal Production University of Bahri. The duration of the experiment was seven weeks (1st of December 2016 to 18th of January 2017).

2.2 Experimental design

Ninety 63-week-old commercial layer hens (White Lohmann) were used in this study. Birds were kept in standard management conditions (semi-closed system house equipped with battery cages). The averages of daily minimum and maximum temperature recorded during the experiment were 27C◦ and 29C◦ respectively.

Chickens were randomly assigned into three dietary treatment groups in complete randomize design. Each group was represented by 30 birds distributed into 6 replicates of 5 birds each. The replicate in this study was

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represented by battery cage (length 47cm, width 40cm and height 47cm).The experimental treatments were as follow: control treatment group (T1) received basal diet only; treatment (T2) received basal diet + 8 ppm flavomycin; treatment (T3) received basal diet + 12 ppm flavomycin. The basal diet provided to the chickens was based on sorghum and groundnut cake (Table 1).

2.3. Performance

Birds were acclimatized to the experimental feed for the first two weeks of the experiment (weeks 64 and 65 of age). Afterwards, egg production percentage, feed intake and egg weight in each pen were daily calculated during the remaining 5 weeks of the experiment.

Table 1: Ingredients and calculated values of the experimental diets fed to laying hens during the experimental period (64-70 weeks).

Ingredients	%
Sorghum grain	54
Groundnut cake	12.01
Wheat bran	18
Super concentrate*	5
Dicalcium phosphate	0.25
Limestone	10
NaCl	0.3
Lysine	0.2
Methionine	0.04
Antimyctoxins	0.2
Total	100
Calculated values	
ME (kcal/kg)	2818
Crude protein (%)	16.64
Methionine	0.37
Met+cystien	0.68
Lysine	0.76
Calcium	4.5
Available phosphorus	0.41

*__Each kg of super concentrate contained:__ crude protein 35%, crude fat t2%, crude fiber 4.5%, calcium 6-8%, phosphorus 4.6%, lysine 6%, methionine 2.5%, methionine+cysteine 3%, sodium 2.3 ME:2000kca/kg.
Added vitamins/kg: vitamin A 200.000 IU, vitamin D3 40.000 IU. Vitamin E 300 mg, vitamin K3 40 mg, vitamin B1 30 mg, vitamin B2 80mg, vitamin B3 180 mg, vitamin B6 40mg, vitamin B12 120mg,niacin 500mg,folic acid 15mg,biotin 400mgcholine chloride 10.000mg.
Added minerals/kg: iron 1.200 mg, zinc 1.000mg, copper 120mg, manganese 1.200mg, iodine 10mg and selenium 4mg.

2.4 Egg quality

For egg quality investigations, 36 eggs were collected at the end the seventh week of the experiment (2 eggs from each replicate with a total of 12 eggs per treatment). Shape index as well as yolk index were determined according to Romanoff and Romanoff [10]. Shell thickness was measured to the nearest 0.01 mm at the equator using a micrometer. Shell percentage [(Shell weight/Egg weight) X 100] was then calculated. The egg yolk visual color score was determined using 15 matching bands of Roche improved yolk color fan. The height of thick albumin and egg yolk were measured with a tripod micrometer and related to egg weight as percentage. Haugh unit was measured according to the method given by Haugh [11].

2.5. Statistical Analysis

Data were analyzed by one way analysis of variance (ANOVA), using PROC MIXED of SAS [12]. Means were compared with Duncan's Multiple Range Test (at 5% level of probability). Egg production percentages were first transformed to arcsine before carrying out the statistical analysis.

3. Results and Discussion

3.1 Performance

Table 2 shows the performance of laying hens dietary supplemented with different levels of flavomycin during the period 66-70 weeks of age. The results showed that there was no significant difference (P>0.05) between the treatments in feed intake and egg production percentage. However, the egg production percentage was numerically increased by about 2% in T2and 3% in T3 as compared to control group. This in line with Hewida [3] who reported that the supplemental level of 75 mg/ton of flavomycin displayed a significant increase in egg production along with decrease in feed intake. In this study, laying hens received diet supplemented with 100 gm/ton of flavomycin showed significant (P<0.05) increase in egg weight. This was in contrast with the findings of Hewida [3] who reported no significant effect on egg weight when given flavomycin. However they stated that significant increase in egg mass occurred with the group receiving 75 mg/ton, as a result of increased production percentage.

3.2 Egg quality

Table 3 shows the effect of feed supplemented with different levels of flavomycin on the external and internal egg quality of laying hens. The results revealed that the supplementation of feed with different levels of flavomycin did not affect albumin height, yolk index and yolk color. Similar findings have been reported by Brake [13], Aboul El-Ella [14] and Nursoy [15]. Moreover, the present study revealed that dietary addition of flavomycin reduced the shell thickness remarkably (P<0.05). Nevertheless, no significant difference was observed in shell percentage between the treatment groups utilized in this study; and this may indicates for increased shell strength. In contrast, Hewida [3] stated that

supplementation with 75 and 100 mg/ton feed of flavomycin decreased shell percentage significantly compared to control group. Taken together, it is concluded that dietary supplementation with flavomycin, in inclusion rate of 8 ppm, enhanced egg production as well as egg weight of aged commercial laying chickens.

Table 2: Effect of Feed Supplemented with Different levels of flavomycin on feed intake (Kg), egg weight (gm) and egg production percentage of laying Hens (66-70 weeks of age)

Parameters	Treatments			SE	LS
	T1	T2	T3		
Feed intake (kg)	3.74	3.80	3.79	0.05	NS
Egg weight (gm)	57.97 [b]	59.50 [a]	58.13 [ab]	0.27	*
Egg production %	88	90	91	0.06	NS

[a, b]= mean followed by different superscript letters are significantly different (p<0 .05).
LS = Level of Significance. SE = Standard Error.
NS = Not Significant (p>0.05).
** = Significant (p< 0.05).*

Table 3: Effect of dietary supplementation with flavomycin on egg quality of commercial laying hens (weeks 66-70 of age)

Parameters	Treatments			SE	L.S
	T1	T2	T3		
Egg length	58.54	58.30	57.49	0.29	N.S
Egg diameter	42.42	42.06	42.53	0.17	N.S
Shell thickness	0.34 [a]	0.30 [b]	0.29 [b]	0.01	*
Shell percentage	11.7	11.9	12.5	0.30	N.S
Shell weight	7.79	7.63	7.65	0.13	N.S
Albumin height	5.35	5.30	4.79	0.18	N.S
Shape index	72.50	72.25	74.09	0.36	N.S
Albumin diameter	66.10	67.89	66.76	0.99	N.S
Albumin weight	34.64	34.08	34.16	0.45	N.S
Yolk height	15.23	15.73	15.76	0.14	N.S
Yolk diameter	40.54	40.02	39.42	0.94	N.S
Yolk weight	17.37	17.13	17.30	0.19	N.S
Yolk color	1.00	1.00	1.00	0.0	N.S
Haugh unit	100.69	100.68	100.65	0.02	N.S

[a, b]= mean followed by different superscript letters are significantly different (p<0 .05).
LS = Level of Significance. SE = Standard Error.
NS = Not Significant (p>0.05).
** = Significant (p< 0.05).*

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