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Effect of Niacin Supplementation on Layers Performance

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Abstract
This study was carried out at Teaching and Research Farm, Federal University of Agriculture, Abeokuta to investigate the effect of niacin supplementation in layers performance. A total of 75 laying birds at 24 weeks of age were used in the trial. Four dietary treatments with niacin at 0 ppm, 30 ppm, 40 ppm, and 50 ppm were fed to the bird for a period of 20 weeks. Each treatment had 18 birds comprising 3 replicates of six birds each. At 0-10 weeks and 10-20 weeks, a significant difference ($p<0.05$) were observed in all the parameters considered except in feed/dozen egg in 10-20 weeks. At 0 ppm lower values were observed for the two age groups in daily feed intake (0.118, 0.118), total feed intake (8.31, 16.57) and average hen day production (57.62, 52.30). Supplementation of niacin up to 50ppm in layers diets led to a significant increase ($p<0.05$) in feed/dozen egg, feed/kg egg and hen- day egg production in the two age groups.

Keywords: Niacin, laying birds, feed intake, feed/dozen egg and feed/kg egg

Introduction

Nutrient requirements vary according to both the physiological condition and health status of the animal, it also differs among type, breeds, strains and birds of different ages of poultry (NRC, 1994). Highly productive animals require more nutrients in terms of quantity and quality than the non-productive ones, which are considered to be at maintenance. Vitamins and Minerals play significant roles in the performance and production of laying chicken. Some vitamins are essential in metabolism but may not be required in the diet, since they can be synthesized readily from other food constituents. Housed layers are generally dependent on the vitamins present in their compounded feed in the correct amount and proportions and any interruption in their supply can give rise to the most serious consequences. The requirement of poultry for vitamin and mineral is a function of series of variations because of the uncertainty of the factors that influence the absolute needs of the animals. Factors such as breed, sex and strain ranked high among the factors that affect the response of birds to an exogenous source of vitamins and minerals.

Niacin also is known as nicotinic acid or vitamin B3 is a water- soluble vitamin which decreases triglycerides level in the body by limiting the ability of the liver to produce low- density lipoprotein (LDL) cholesterol. Niacin is used to promote healthy cholesterol levels, support circulation problems, and maintain skin health. Niacin has antioxidant properties, and is involved in the energy production, cholesterol and carbohydrate metabolism, regulation of blood sugar, and detoxification. Niacin can reduce LDL cholesterol levels by 10-20%, reduce triglycerides by 20-50% (Sullivan 2006). Oloyo (2002) reported a remarkable improvement in the utilization of nitrogen, metabolizable energy, calcium and phosphorus when higher dietary niacin levels were used in broiler chicken. The objective of this study was to determine the effect of different levels of inclusion of niacin in the diet of laying birds on their performance.

Materials and Methods

This study was carried out at the Poultry Unit of Teaching and Research Farm, University of Agriculture, Abeokuta, ($7^0 10^0$N and (32^0E) in Ogun State. The area has an average rainfall of 1100mm, mean ambient temperature of about 34^0C and yearly average relative humidity of 82%. Seventy-two (72) Harco brown laying birds at 24 weeks old were randomly allocated to the four dietary treatments of 18 birds each in a completely randomized design. Each treatment group was further divided into three replicates of 6 birds each. Feed and water were supplied *ad libitum*, while vaccination with necessary medication was administered to the birds accordingly. The housing system was battery cage. The experiment lasted for 20 weeks. Samples of the experimental diets were analysed using A.O.A.C (1990) method for the proximate composition of dry matter (DM), crude protein, ether extract, crude fibre, ash content and nitrogen free extract. Composition of the experimental diets is shown in Table 1.Data were collected on daily feed intake, total feed intake, feed per dozen egg, feed per kilogram egg and percentage average hen day production for 0-10 weeks in laying and 10-20 weeks in laying.

Data obtained for laying performance were subjected to general linear model analysis of variance using (SAS, 1999) and significant means were separated using Duncan's Multiple Range Test.

Table 1: Composition of experimental diets.

		Niacin level		
Ingredients	0 mg/kg	30 mg/kg	40 mg/kg	50 mg/kg
Maize	45.00	45.00	45.00	45.00
SBM	8.50	8.50	8.50	8.50
GNC	7.00	7.00	7.00	7.00
Wheat offal	26.80	26.80	26.80	26.80
Fish meal	2.00	2.00	2.00	2.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	8.00	8.00	8.00	8.00
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Methionine (%)	0.10	0.10	0.10	0.10
Lysine (%)	0.10	0.10	0.10	0.10
Niacin (ppm)	-	+	++	+++
Total	100	100	100	100

Results and discussion

The performance response of the laying birds during 0-10 weeks and 10-20 weeks (Table 2) of the experiment showed that niacin supplementation in the diet resulted in a significant variation ($p<0.05$) in the values recorded for daily feed intake, total feed intake, feed conversion ratio and hen- day egg production.Increase in feed consumed per dozen eggs laid was observed when fed layers diet supplemented with niacin. The hen- day egg production was higher in birds fed 30 ppm niacin supplemented diets. The higher feed consumption per kg egg and per dozen eggs could have translated to a better hen- day egg production. Tucker *et al.* (2003) observed similar improvement when laying hen diets were supplemented with organic minerals. The observed response could be due to the higher efficiency of feed utilization across the treatments.

The gradual increase in feed efficiency translates to an increase in Hen day production. This suggests that niacin level between 30 ppm and 50 ppm in the laying hen diets could result into a better egg production. Similar observation was made by Leeson *et al.* (1991) who reported better egg production at 66 mg/kg of niacin based diets. The study equally showed a significant increase in daily feed intake and total feed intake at 40 ppm of niacin supplemented diets. The trend of egg production over the period of the study was in agreement with the observation of Anthony (1990) and Ola (1999). The researchers observed a continuous increase in egg production in the first 10 weeks in lay, followed by steady-highest egg production between 10 – 14 weeks in lay and gradual decline as the birds aged.

Table 2: Effect of niacin supplementation on performance of laying hens

Parameters	0ppm	30ppm	40ppm	50ppm	SEM
0-10 weeks in lay					
Daily feed intake/kg	0.118^{b}	0.119^{ab}	0.121^{a}	0.120^{ab}	0.002
Total feed intake/kg	831^{b}	8.38^{ab}	8.42^{a}	8.40^{ab}	0.017
Feed/dozen egg	2.47^{ab}	2.23^{b}	2.40^{ab}	2.64^{a}	0.059
Feed/kg egg	3.22^{ab}	2.88^{b}	3.20^{ab}	3.51^{a}	0.086
Avg. hen-day production %	57.62^{ab}	64.29^{a}	60.47^{b}	54.76^{ab}	1.440
10-20 weeks in lay					
Daily feed intake/kg	0.118^{b}	0.119^{ab}	0.121^{a}	0.120^{ab}	0.002
Total feed intake/kg	16.57^{b}	16.67^{ab}	16.85^{a}	16.89^{a}	0.040
Feed/dozen egg	2.71	2.31	2.10	2.66	0.108
Feed/kg egg	3.59^{a}	3.06^{b}	3.18^{ab}	3.64^{a}	0.096
Ave. hen-day production %	$52.3\,8^{b}$	62.14^{a}	59.33^{ab}	54.14^{b}	1.490

^{abc} Means on the same row having different superscripts are significantly different ($P < 0.05$)

Conclusion and Recommendation

It could be concluded that there was as improvement in the performance of laying birds as the level of inclusion of niacin increased. Therefore, it could be recommended that supplementation of layers diets with 50 mg/kg niacin level was adequate to improve and optimize productive performance, feed/dozen egg, feed/kg egg, better egg weight.

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