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**PERFORMANCE AND EGG QUALITY PARAMETERS OF LAYER HENS FED DIET WITH AND WITHOUT VITAMIN E SUPPLEMENTATION**

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**Abstract**

Performance and egg quality parameters of layer hens fed diet with and without vitamin E supplementation was determined. A total of hundred (100) Golden sex link strains were used for this study. At point of lay (19weeks) the hens were transferred to battery cage and were randomly assigned to two dietary treatments with 50 birds per treatment. Each treatment had five replicates with 10 birds per replicate. Each treatment received diet in t-test experimental design daily. Birds in T<sub>1</sub> (control) had no vitamin E supplementation in their diet, while those in T<sub>2</sub> received 400mg vitamin E kg<sup>-1</sup> dietary supplementation. From the results, there was no significant (p>0.05) difference in mean values for body weight gain, while mean values for egg weight, egg length, egg diameter, yolk weight, albumen weight and shell weight of the birds were significant (p<0.05). Hens in treatment two which were fed diet containing vitamin E supplementation had the highest (p<0.05) values in egg weight, egg length, egg diameter, yolk weight, albumen weight and shell weight compared to treatment one (control). In conclusion, dietary supplementation of vitamin E at 400mg kg<sup>-1</sup> enhanced egg quality in the hens is recommended.

**Key Words:** Vitamin E, Golden link strain, egg weight, egg shell and egg diameter

**INTRODUCTION**

Despite the general acceptability of poultry products such as eggs, the poultry industry is still plagued with a lot of problems which must be resolved for any meaningful progress to be made. One of such problems that have led to poor layer performance, decline in egg production quality and size is heat stress (Deng *et al.*, 2012). The effect of heat stress and heat induced oxidative stress caused by elevated environmental temperature can result o reduced productivity (St-Pierre *et al.*, 2003). Heat stress reduces the reproductive performance of laying hens by disruption of hormones involved in reproduction (Donoghue *et al.*, 1989). Layers exposed to high ambient temperature resulted in decreased egg production and quality (Allahverdi *et al.*, 2013; Aberra *et al.*, 2010). Feed intake, egg production, egg weight and shell quality were decreased in heat-stressed birds ([Putpongsiriporn \*et al.\*, 2001](#)).

However, one of the feeding protocols that will help to assuage these negative effects of heat stress in laying birds is the inclusion of vitamin E in their diets. Vitamin E is the most active natural antioxidant used in animal feeding. Vitamin E protects the cell membranes from damage ([Yu, 1994](#)). It was also reported that vitamin E supplementation at high levels can improve egg performance in hens exposed to heat stress ([Bollengier-Lee \*et al.\*, 1998](#)). Moreover, [Putpongsiriporn \*et al.\* \(2001\)](#) observed that the addition of vitamin E to hen diets decreased the detrimental effects of heat stress and it increased the egg quality.

**MATERIALS AND METHODS****Location and duration of study**

The study was carried out at the Department of Animal Science Teaching and Experimental Farms, Poultry Section of the University of Nigeria, Nsukka Enugu State. It is located on latitude 6<sup>o</sup>25N and longitude 7<sup>o</sup>24E at an altitude of 430m above sea level (Breinholt *et al.*, 1981). The average maximum ambient temperature ranges from 33<sup>o</sup>C and 37<sup>o</sup>C (Okonkwo and Akubuo, 2007). The annual rainfall ranges from 1567.05mm-1846.98mm (Metrological Center, Crop Science Department, University of Nigeria, Nsukka Enugu State). The study lasted for three months.

**Experimental materials**

Vitamin E was obtained from a reputable pharmacy in Nsukka Enugu State. Other feed ingredients such as maize, lysine, vitamin premix were purchased from Chidera feedmill limited, Nsukka, Nigeria.

**Experimental Animals and Management**

One Hundred (100) pullets (Golden links trains) were purchased at day old from Fidan Breeders, Ibadan Nigeria and reared for 19 weeks after which they were transferred to the battery cages upon commencement of egg lay. They were randomly assigned to two dietary treatments, having 50 birds per treatment and replicated five times with 10 birds per replicate. 400mg vitamin kg<sup>-1</sup> was supplemented for diets for hens in treatment two, while treatment one (control) did not have Vitamin E supplementation. The experiment lasted for 12 weeks (3months)

**Table 1:**Percentage ingredients compositions of experimental diets

<b>Ingredients</b>	<b>Quantity (%)</b>
Maize	40.00
Wheat offal	30.00
Soya bean meal	20.00
Salt	0.25
Lysine	0.25
Methionine	0.25
Bone meal	9.00
Vitamin premix	0.25
Total	100.00

**Table 2:**Proximate compositions of experimental diets

<b>Compositions</b>	<b>Percentage</b>
Crude fiber	5.31
Ether extract	3.10
Ash	11.31
Moisture	12.00
Crude protein	16.50
Met.Energy Kcal.kg <sup>-1</sup>	2470.00
Nitrogen free extract	55.78



### Parameters measured

#### Determination of performance and egg quality parameters of layer hens

The birds were weighed every two weeks to monitor growth performance. For egg quality parameters, seven eggs per each replicates were taken on weekly for the determination of egg length (cm), Egg diameter (cm), Yolk weight (g), Albumen weight (g), Shell weight (g) and Egg weight (g).

#### Statistical Analysis

Data collected were analyzed using t-test model.

#### Results and Discussion

Table 3 and 4 show the results of the performance and egg quality parameters of the layer hens fed diet supplemented with vitamin E. Egg weights, egg length, egg diameter, yolk weight, albumen weight and shell weight were significantly ( $P < 0.05$ ) affected by dietary treatments, while body weight did not show significant ( $P > 0.05$ ) difference. The hens in treatment two showed significantly higher egg weight, egg length, egg diameter, yolk weight, albumen weight and shell weight compared to those fed control diet. This could be attributed to the supplementation of vitamin E which functions to cushion the effect of heat stress thereby limiting its negative effects on layer performance (Allahverdi *et al.*, 2013; Aberra *et al.*, 2010). Heat stress affects performance and egg quality in layer hens because it poses negative effects on the process of egg formation (Donoghue *et al.*, 1989). Putpongsiriporn *et al.* (2001) observed that the addition of vitamin E to layer hen diets decreased the detrimental effects of heat stress and increased the egg quality. This is consistent with the findings of this study.

**Table 3:** Performance results of the layer hens fed diets containing vitamin E supplementation

Parameters	T1(Control)	T2(Fed vitamin E)
Egg weight(g)	58.18±2.64 <sup>b</sup>	72.79±1.99 <sup>a</sup>
Body weight(kg)	1.48±0.02	1.55±0.01

<sup>ab</sup>Means with different superscript are significantly different( $p < 0.05$ )

**Table 4:** Results of the egg quality parameters of layer hens fed diets containing vitamin E supplementation

Parameters	T1(Control)	T2 (Fed vitamin E)
Egg length (cm)	5.20±0.40 <sup>b</sup>	6.55±0.08 <sup>a</sup>
Egg diameter (cm)	5.55±0.42 <sup>b</sup>	6.85±0.05 <sup>a</sup>
Yolk weight (g)	12.53±0.99 <sup>b</sup>	16.19±0.31 <sup>a</sup>
Albumen weight (g)	29.69±2.32 <sup>b</sup>	36.51±0.65 <sup>a</sup>
Shell weight (g)	5.19±0.40 <sup>b</sup>	6.62±0.08 <sup>a</sup>

<sup>ab</sup>Means with different superscript are significantly different( $p < 0.05$ )

### CONCLUSION AND APPLICATION

In conclusion, supplementation of vitamin E at 400mg kg<sup>-1</sup> in layer diet was found to enhance egg quality parameters. It is therefore recommended to egg producers for utilization.



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