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Effect of Age and Weight on Laying Performance and Egg Weight among Harco Hens

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Abstract
This study was designed to determine the effect of age and weight on laying performance and egg weight among Harco hens. Laying performance and egg weight were compared between three weight ranges of beak trimmed commercial Harco hens in conventional battery cages. Seventy two Harco hens, age 32 weeks were divided into three groups corresponding to 3 weight ranges; 1.35 – 1.59kg (WRI), 1.60 – 1.80kg (WR2) and 1.81 – 2.20 kg (WR3). The hens were fed a commercial layers ratio for three months (12 weeks) during which the average egg weight and hen day egg laying performance of each weight range was determined. The average monthly production of WR3 layers was 295 eggs per 24 layers, whereas, those in WR2 range and WR1 laid 283 and 232 eggs per 24 layers respectively. WR3 hens laid 63 eggs more than WR1 hens per month, while age significantly ($P < 0.05$) affected laying performance. The effect of body weight on laying performance was significantly different ($P < 0.05$). The average weight of eggs laid by WR1, WR2 and WR3 hens were 53.20 – 60.4g, 53.50 – 64.6g and 56.5 – 63.2g. There were therefore, significant differences ($P < 0.05$) in weights of eggs laid by hens in three weight ranges. The results therefore, show that laying performance and egg size are positively affected by age and body weight in Harco breed.

Keywords: Hen age, weight, laying performance, Egg weight, Harco hens

Introduction

Table eggs are produced by domestic hens which are kept in battery cages and deep litter systems. Several efforts have been made towards improving the laying performance and egg weight of laying hens of different breeds and strains. The ability to make significant changes to egg weight enables the egg producer to adapt to market demands, manipulating the age at sexual maturity or body weight at start of lay; it is possible to improve egg weight by 1 to 3g (Joly *et al*., 1997). Several techniques have been used to improve the egg weight and laying performance of hens. An increase in egg weight can be obtained immediately by using a cyclic lighting programme. Morris (1980) and Koutoulis *et al*. (1997) stimulated Isa Brown pullets at eight weights of lay by increasing day length by 0, 4 and 8 hours. They obtained a change in mean egg weight of 3g without changing the overall egg mass. Unsaturated fat inclusion in the diets of laying birds has also been successfully employed to increase egg weight by 1 – 2g (Haile, 1996). However, such increase in egg weight varies according to the type of fatty acid ingredient used, but also according to its level of incorporation (Meluzi *et al*., 2001). Average egg weight is also dependent upon pullet body weight at start of lay (Lewis, 1992). Genetically, each layer strain has a potential range of egg weights which can vary by about 3.5g (Legstad Random sample test, 2000).

Reducing the level of one or several amino acids can lead to a decrease in egg weight, but always results in a reduced rate of lay (Jais *et al*., 1995). In hot tropical countries or during summer in temperate countries, heat has a marked limiting effect on feed intake and causes a reduction in laying performance. Peguri and Coom (1993) observed that at high temperature, feed consumption and egg production rates of fully feathered hens are considerably lower than for hens with 50% plumage. Similarly, different housing systems for laying hens have considerable effects on performance and production traits such as egg weight, feed efficiency, daily feed consumption and mortality (Taylor and Hurnik, 1996; Van Horne, 1996; Suto *et al*., 1997).

Over the last few decades, several exotic strains of laying hens have been imported and reared under the hot humid tropical environment of Southern Nigeria. While several of these exotic breeds have performed well on average under the prevailing housing and management conditions; improvements are desired especially as

production costs continue to rise (Adene and Oguntade, 2006). Any improvement in management leading to increase of egg weights and hen day egg production will help the farmer to optimize profit especially when this is achieved without any increase in feeding cost. Studies that relate to hen age laying performance and egg weight could help regulate feed supply and therefore feeding cost across the laying cycle of the hen.

Materials and Methods

The experiment was carried out in the Poultry Unit of the School of Agriculture and Agricultural Technology, Federal University of Technology, Owerri, in the hot humid Southeast, Nigeria. The birds used for the experiment were 32 weeks old Harco breed laying hens managed in the battery cages. One hundred of these layers were randomly selected and weighed. Seventy-two of these were tagged for individual identification and grouped into 3 weight ranges such that 1.35 – 1.59kg birds formed the weight range 1 (WR1), 1.60 – 1.89kg weight range 2 (WR2) and the 1.81 – 2.25kg weight range 3 (WR3). Each weight range had a total of 24 layers which were further divided into three replicates of eight birds each in a completed randomized design (CRD). The birds were fed commercial layers ration *ad-libitum* which on analysis contain Crude protein, 5.00% fat/oil, 6.00% crude fibre, 1.60% calcium, available phosphorus 0.45%, lysine 0.80%, Methionine 0.34%, Salt (min) 0.30%, Kcal/Kg metabolizable energy (Min) 2.500.

Eggs were collected at 3pm each day for 3 months. The number of eggs laid by each replicate and also in each weight range was recorded and hen-day-laying performance calculated. The weights of eggs per replicate were determined and the average weight calculated and recorded daily. Data collected on the laying performance of the different weight ranges per month and their average egg weights were analysed using means, percentages and graphs.

Results and Discussion

In Table 2 and 3 are given the results of the effects of age and weight on the laying performance and weight of egg weight among Harco hens. The effect of age and weight on laying performance showed the average egg production of WR3 layers (1.81 – 2.25kg) to be 295 eggs in 12 weeks, whereas, weight range 2 (WR2) layers and weight range 1 (WR1) layers produced 283 and 232 eggs respectively during the same period of time (Table 1). WR3 birds produced 72 more eggs per 24 layers than WR1 birds and 12 more eggs than WR2 layers. WR2 birds laid 51 eggs more than WR1 layers. Generally, the laying performance increased with increasing weight of layers.

The effect of hen age and weight on egg weight is shown in Table 2. WR1 layers produced eggs whose average weight varies between 53.20 – 56.80; those of WR2 layers varied between 53.50 – 64.60 and WR3 varied between 55.10 – 63.20. Generally, the average egg weight increased as the weight of the layers increased. Also, the age of the layers had a positive effect on egg weight.

The results obtained in this study confirmed the observation made by Oluyemi and Robert (2000) that the age of hens affect laying performance with peak production occurring between 52 and 62 weeks of age. It was also observed that the body weight of hens had a positive effect on laying performance. Layers in WR3 laid 12 and 63 more eggs per 24 layers per month than those in WR2 and WR1 respectively. The effect of age on laying performance and egg weight was also reported by Morris (1980) and Koutoulis (1997), who stimulated Isa Brown pullets at 8 weeks of age by increasing day length by 0.4 and 8 hours and obtained a change in mean egg weight of up to 3g without changing the overall egg mass.

By using appropriate techniques, the age at start of lay can be changed to produce eggs of weight required by the market without affecting the total egg mass produced. The result obtained on effect of age and weight on egg weight showed that as the age and weight of the hens increased from 40 – 43 weeks, the egg weight increased from 65 – 67g in weight ranges 2 and WR3 in Harco hens. The finding was in agreement with Ledur *et al*. (2002) and (Johnson *et al*., 2007) who reported that egg weight increased with the age of hens. Generally, hen body weight positively affected egg weight with heavier hens tending to lay bigger eggs. At 20 weeks, birds kept on the floor were heavier than caged birds and they laid larger eggs at least partly because body weights and egg weights are positively correlated (Siegel, 1962). Brown egg layers were heavier and laid larger eggs with greater egg yolk and albumen weights than white egg layers, which is in general agreement with Scott and Silversides (2000). A change in egg weight can easily be obtained by modifying age at sexual maturity or by changing body weight at sexual maturity (Morris, 1980; Koutoulis *et al*. 1997).

Conclusion

The result of this study showed that the laying performance of Harco hens increased as the body weight increased. Heavier hens laid more eggs per unit time than lighter hens of the same age. Generally, the hen body weight positively affected egg size. Heavier hens tended to lay bigger eggs. It is therefore recommended that should the need arise to decrease the stocking rate of Harco hens, light hens should be culled before the heavier ones. The study did not determine the comparative feed efficiency ratio of the heavier and lighter hens. If and when this is done, more precise economic decision would be made.

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Table 1: Effect of Hen Age and Weight on Egg weight

	Age of layers (weeks)/Egg weight											
Weight ranges of layers (Kg)	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**
1.35 – 1.59 (WR1)	58.5	53.2	57.0	57.20	55.60	56.60	59.0	57.1	55.20	59.50	60.40	57.70
1.60 – 1.80 (WR2)	56.50	57.90	59.00	56.10	53.50	57.40	58.80	60.00	59.20	63.80	64.60	62.70
1.81 – 2.25 (WR3)	56.50	56.70	58.60	58.1	59.80	59.10	57.30	62.80	55.10	61.90	63.20	63.20

Eggs were weighted only on the last day of each week

Table 2: Effect of hen weight range on laying performance

Weight range	Minimum	Maximum	Mean ($\bar{x}$)	SD	SEM
WR 1 (1.35 – 1.59kg)	138	325	232	76.34	25.45
WR2 (1.60 – 1.89kg)	198	367	283	68.99	23.00
WR3 (1.81 – 2.25kg)	234	356	295	49.81	16.60

SD = Standard deviation, SEM = Standard Error mean

Table 3: Overall effect of hen weight range on egg weights

Weight range	Minimum egg wt (g)	Maximum egg wt (g)	Mean ($\bar{x}$) egg wt (g)	SD	SEM
WR 1 (1.35 – 1.59kg)	53.20	60.40	56.80	2.94	0.98
WR2 (1.60 – 1.89kg)	53.50	64.60	59.05	5.11	1.70
WR3 (1.81 – 2.25kg)	55.10	63.20	59.15	3.31	1.10

SD = Standard deviation, SEM = Standard Error mean

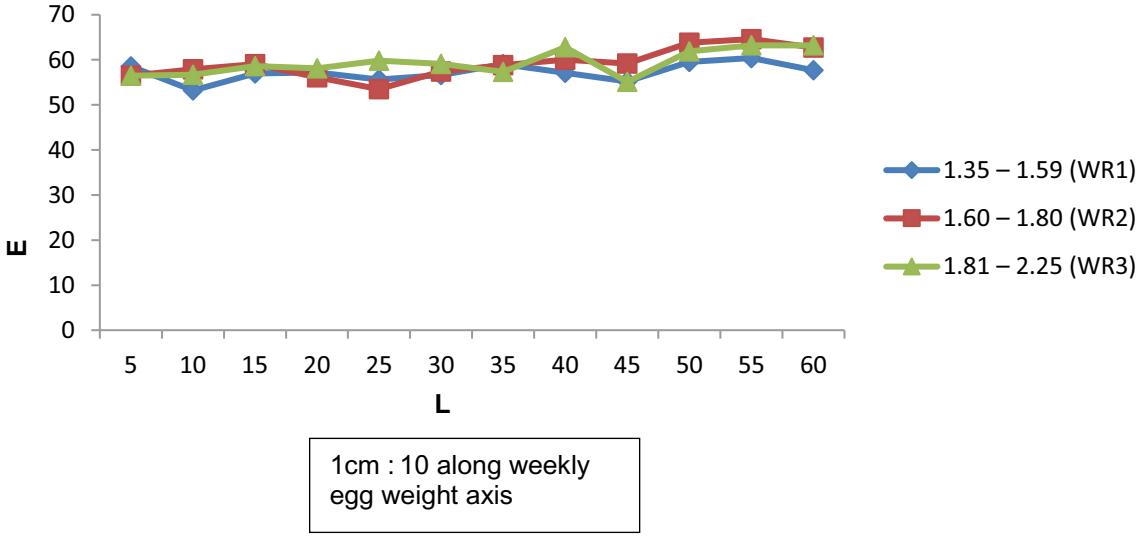

Figure 1: Effect of hen weight range on a weekly egg weights