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INFLUENCE OF WEIGHT GROUPING ON THE SHORT TERM EGG PRODUCTION OF TWO STRAINS OF LAYER TYPE CHICKEN

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ABSTRACT

An experiment was conducted using 400 pullets each of H and N brown Nick (Strain I) and Black Olympia (Strain 2) to determine the influence of weight grouping on short term egg production traits. The two strains of layer type chickens were separated on the basis of plumage pattern and body weight at three weeks of age. The result indicates that the high bodyweight (HBW) groups were significantly (P < 0.05) heavier than the light bodyweight (LBW) categories up to the time of first egg in both strains. The HBW and LBW groups were similar in total feed to first egg in both strains. The HBW lines in strain 2 produced significantly (P < 0.05) heavier eggs at first egg, at 30 and 40 weeks compared to the LBW class. There was no significant (P > 0.05) difference between the HBW and LBW lines in strain I for weight of first egg, egg weight at 30 and 40 weeks respectively. Henday rate of lay and total egg mass did not vary according to bodyweight groups in both strains 1 and 2. However, the light brown pullet groups (LBHBW and LBLBW) in strain I were significantly (P < 0.05) superior to the dark brown counterparts (DBHBW and DBLBW) in henday rate of lay and total egg mass. The results further showed that the HBW groups in strain 1 were significantly (P < 0.05) more efficient in converting feed to eggs than the LBW counterparts. In strain 2, there was no significant (P > 0.05) difference between the HBW and LBW groups in feed per dozen eggs. The comparative performance between the two strains of chicken showed that strain I was significantly (P < 0.01) superior to strain 2 in weight of first egg, egg weight at 30 and 40 weeks and henday rate of lay respectively. The two strains of chicken were similar in body weight at first egg and feed per dozen eggs. Based on these results, the only apparent advantage of rearing the HBW and LBW pullet groups separately was in the efficiency of converting feed to eggs in strain I and in weight of first eggs, egg weight at 30 and 40 weeks in strain 2. Between the two strains of chicken, farmers may opt for strain I pullets because of its superior performance in egg number and egg weight traits.

Keywords: Bodyweight groups, Egg production, Bird strains, Superiority

INTRODUCTION

Variation in bodyweight of birds within the same breed from hatching to sexual maturity has been reported (Ayorinde and Oke, 1995). This variation can be attributed to genetic and environmental factors that affect individual performance. Consequently, pullets are reared in groups according to their body weight (Okpokho *et al.,* 1987) in order to obtain improved performance of the flock. The advantage of such a practice, apart from allowing the birds to grow in their social group and competitive abilities, is evident in the number of eggs laid at the short term (Costa *et al*, 1980, Leeson and Summer, 1987). Another advantage is that the system allows the breeder to have full control of their growth rate and egg production. The estimation of genetic parameters for these traits will help the breeder in selecting breeding birds. Reports on the effect of weight grouping on the growth and laying performance of birds under the Nigerian condition is fast emerging, however, Ayorinde and Oke (1995) reported that heavy body weight (HBW) birds were superior to the low body weight (LBW) category in bodyweight through 32 weeks of age but not in egg production traits.

The objective of this study is to examine the impact of rearing pullets according to bodyweight groups on short term egg production. The study also compared the two strains of layer type chicken on short term egg production.

MATERIALS AND METHODS

Stocks: A total of 800 day old chicks comprising 400 H and N Brown Nick (strain I) and 400 Black Olympia (strain II) were used for the study. The two exotic strains were procured from farm (Avian Specialist), Ibadan, Oyo State. These groups were established on 18th December 1996 at the poultry breeding research unit, Enugu State University of Science and Technology Enugu.

Separation into Lines: At three weeks of age, the two strains were separated on the basis of plumage pattern and body weight. The H and N Brown Nick were separated into light brown (LB) and dark brown (DB) while the Black Olympia pullets were separated into pure black (PB) and golden black (GB). Individuals within the four groups were further separated on the basis of body weight into light body weight (LBW) and high body weight (HBW). Within a group, individual birds weighing 150 g and less were classified as LBW while those weighing more than 170 g were classified as HBW. Individuals weighing 151 – 169g were not used because they were very

Table I: Egg production characteristics of two commercial layer strains grouped according to bodyweight

Traits	Strain 1				Strain II			
	LB(HBW),	LB(LBW),	DB(HBW),	DB(LBW),	PB(HBW),	PB(LBW),	GB(HBW),	GB(LBW)
Age at first egg (days)	162.14[a]	160.00[a]	172.20[a]	177.20[a]	153,17[b]	155.50[b]	155.50[b]	152.20[b]
	(5.65)	(4.27)	(3.49)	(2,22)	(6.17)	(7.04)	(5.38)	(6.72)
Bodyweight at first egg (g)	1520.00[b]	1422.09[a]	1649.17[c]	1595.71[b]	1503.89[b]	1438.89[a]	152538[b]	1416.92[a]
	(32.62)	(20.06)	(60.41)	(27.80)	(24.62)	(43.89)	(26.55)	(26.69)
Total feed to first egg (g/bird)	12056.52[a]	11752.93[a]	12016.41[a]	13096.79[a]	10947.03[b]	9987.00[b]	10760.13[b]	9567.42[b]
	(42.88)	(41.51)	(40.13)	(40.09)	(36.99)	(36.53)	(41.51)	(106.97)
Weight of first egg (g)	48.19[c]	47.96[c]	50.17[c]	51.32[c]	44.37[b]	40.29[a]	44.52[b]	38.86[a]
	(1.47)	(1.33)	(1.53)	(1.17)	(1.58)	(0.90)	(2.02)	(1.33)
Egg weight at 30 weeks (g)	55.37[a]	56.30[a]	56.72[a]	56.82[a]	55.47[b]	53.74[a]	55.92[b]	52.16[a]
	(0.53)	(0.86)	(0.74)	(0.62)	(0.72)	(1.10)	(0.85)	(0.93)
Egg weight at 40 weeks (g)	58.36[a]	59.38[a]	58.74[a]	58.96b[a]	59.71[b]	56.38[a]	58.97[b]	55.88[a]
	(0.60)	(0.94)	(0.73)	(0.60)	(0.57)	(0.84)	(1.24.)	(1.10)
Hen day rate of lay (%)	77.12[b]	72.01[b]	56.85[a]	59.44[a]	62.20[c]	56.94[c]	70.79[c]	61.34[c]
	(3.45)	(4.53)	(3.71)	(6.78)	(3.93)	(4.30)	(3.27)	(4.17)
Total egg mass (weekly) kg	0.31[b]	0.28[ab]	0.23[a]	0.25[ab]	0.24[a]	0.21[a]	0.28[a]	0.24[a]
	(0.02)	(0.02)	(0.02)	(0.03)	(0.2)	(0.02)	(0.01)	(0.02)
Feed per dozen eggs	2.20[a]	2.87[b]	3.59[c]	4.07[d]	2.70[a]	2.84[a]	2.83[a]	3.12[a]
	(0.12)	(0.19)	(0.32)	(0.92)	(0.14)	(0.16)	(0.24)	(0.24.)
Laying mortality (%)	1.50	1.65	1.20	1.36	2.02	2.40	5.26	2.15

Mean for each trait within each strain followed by different letter superscripts differ significantly (P<0.05) Note I: Laying mortality not statistically tested. LB: Light brown, DB: Dark brown, PB: Pure black, GB: Golden Black, HBW: High bodyweight, LBW: Light bodyweight

Table 2: Short term egg production traits of two strains of layer type chicken

Traits	Strain 1	Strain 2
Age at first egg (days).	166.48 ± 2.56[b]	153.93 ± 3.10[a]
Age at peak egg production (days)	196.00 ± 4.00[a]	207.00 ± 6.27[b]
Body weight at first egg (g)	1518.93 ± 21.12[a]	1471.25 ± 16.24[a]
Total feed to first egg (g / bird)	12230.66 ± 41.15[b]	10315.40 ± 55.30[a]
Weight of first egg (g).	49.41 ± 0.70[b]	41.76 ± 0.81[a]
Egg weight at 30 weeks (g)	56.06 ± 0.41[b]	53.85 ± 0.53[a]
Egg weight at 40 weeks (g)	59.81 ± 0.55[b]	58.26 ± 0.59[a]
Henday rate (%) kg/week)	66.83 ± 2.57[b]	62.82 ± 2.03[a]
Total egg mass	o.27 ± 0.01[a]	0.24 ± 0.01[a]
Feed per dozen eggs	3.23 ± 0.26[a]	2.81 ± 0.10[a]
Livability (%)	92.50[a]	97.00[b]

a, b means within a row with different superscripts are significantly different (P< 0.01)

few. These groups were divided into two replicates each and randomly assigned into different pens. They were monitored for egg production traits in the short term.

Bird Management: The birds in each group were brooded for 8 weeks and raised on deep litter floors to sexual maturity by adhering to standard management procedures described by Oluyemi and Roberts (1979). Chicks were fed a top feed containing 19 % CP and 2685 Kcal ME/Kg for 8 weeks. From 8-18 weeks, the birds were fed growers mash containing 16 % CP and 2642 Kcal ME/Kg while from 19 weeks to the end of the test, they were provided with layers mash containing 2676 Kcal ME/Kg, 17 % CP and about 3 % calcium. Feed and water were provided *ad libitum* throughout the period. The birds were also vaccinated against New castle disease, gumboro and fowl pox diseases at the appropriate ages. 'Vitalyte', a vitamin supplement was occasionally administered in the drinker.

Data Collection and Analysis: Feed intake was recorded on a daily basis while bodyweight was taken on 4 weekly intervals. Age at first egg was taken as the number of days from hatch to the first egg. Hen day rate of lay was taken as the number of eggs laid by each group on a given day divided by the number of birds alive expressed in percentage. Average weight of egg was taken at first egg, 30 and 40 weeks of age respectively. Total egg mass was obtained as the product of egg number and egg weight. Feed per dozen eggs was calculated as kilogram of feed intake divided by number of eggs produced (in dozens). All the data collected were subjected to analysis of variance in a completely randomized design using unequal cell replicate model as given by Winer (1971). Significant mean values were separated using Duncan multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Table I presents the short term egg production traits of two strains of layer type chickens grouped according to body weight. Significant differences ($P < 0.05$) within strain lines were observed in some of the egg production traits. Bodyweight at first egg was significantly ($P < 0.05$) higher in the HBW groups compared with the LBW categories for both strains 1 and 2. This was in conformity with what was obtained at 4 – 20 weeks of age where the HBW groups were significantly ($P < 0.01$) heavier than the LBW categories in both strains (Omeje *et al* 1997, 1998). Total feed to first egg was similar among the LBW and HBW lines in both strains 1 and 2 thereby re-affirming the assertion of Duplessis and Erasmus (1972) that feed intake per bird was similar irrespective of bodyweight. There was no significant ($P > 0.05$) difference between the lines in strain I for weight of first egg, egg weight at 30 and 40 weeks respectively. However, significant ($P < 0.05$) difference was observed among the lines in strain 2 for weight of first egg, egg weight at 30 and 40 weeks respectively. The HBW lines were superior to their LBW counterparts in egg weight traits. A similar observation was recorded by Ayorinde and Oke (1995) in the short term egg weight of LBW and HBW groups of Black Olympia layers. The light brown pullet lines (LBLBW and LBHBW) were significantly ($P < 0.05$) superior to their dark brown counterparts (DBLBW and DBHBW) for hen day rate and total egg mass. This suggests that the major genes influencing the inheritance of light brown plumage in these birds may be correlated with the factors controlling the rate of egg production. Nestor and Renner (1979) had earlier shown that the major gene responsible for the inheritance of plumage pattern also influences the inheritance of quantitative traits in chickens and turkeys. There was no significant ($P > 0.05$) difference between the HBW and LBW lines in strain 2 for hen day rate and total egg mass. Feed per dozen eggs were similar irrespective of bodyweight groups in strain 2. However in strain 1, the HBW groups were significantly ($P < 0.05$) more efficient in converting feed to eggs than the LBW counterparts. A contrary observation was reported by Render and McDaniel (1984), Ayorinde et al (1988) and Ayorinde and Oke (1995) that the small sized birds of the LBW groups were more efficient in egg production than those of the HBW. Laying mortality was similar among the lines in strain 1. The GB (HBW) line in strain 2 recorded more mortality compared to other groups.

A summary of the short term egg production traits of the two strains of layer type chickens are presented in Table 2. Although strain 2 came to lay about 13 days earlier than strain 1, the later reached peak egg production about 11 days earlier than the former. Strain I was significantly ($P < 0.01$) superior to strain 2 in weight of first egg, egg weight at 30 and 40 weeks and hen day rate of lay indicating that the two strains of layer type chickens were genetically different in these traits. However, the short term egg number (in henday basis) and egg weight traits obtained for the two strains were within the range reported for other exotic layer strains in Nigeria (Omeje, 1983; Asuguo and Ofobruketa, 1991). Body weight at first egg and feed per dozen eggs were similar in both strains. Strain I consumed significantly ($P < 0.01$) more feed to first egg compared to strain 2 probably on account of the delay in the commencement of lay. Strain 2 had significantly ($P < 0.01$) higher livability than strain 1 probably because of its better adaptability to the environment.

Conclusion: The results of this study have shown that the HBW groups were superior to their LBW counterparts in the efficiency of converting feed to eggs in strain I and in weight of first egg, egg weight at 30 and 40 weeks in strain 2. Therefore, rearing of pullets according to bodyweight groups is advantageous and could be practiced by poultry farmers. Between the two strains of layer type chickens H and N Brown Nick (Strain 1) has demonstrated superiority to Black Olympia pullets (strain 2) in egg number and egg weight traits.

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