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Effect of Season on Performance of Egg-type Poultry

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Abstract

The effect of season on performance of a commercial laying stock (Lohman Brown) was investigated. Parameters evaluated were hen-day egg production, incidence of mortality and cracked-egg. Seasonal record was divided into four seasons as follows: early rainy season ERS (April-June), late rainy season (July-September), early dry season (EDS) and late dry season (LDS). Least square mean analysis revealed significant (P<0.05) effect of season on egg production between LDS (58.24%) and ERS (68.27%) also between LDS and EDS (69.17%). Similar effect was observed for incidence of cracked-egg, where highest egg crack recorded in LDS (5.49%) was significantly (P<0.05) different from values recorded in ER (1.53%), LR (1.47%) and ED (1.92%) seasons while there was no significant (P>0.05) seasonal variation effect on incidence of mortality. However, highest incidence of mortality (3.59%) was recorded in LDS. Consistent least values for parameters evaluated in EDS and LDS established the fact that change in season exerted influence on performance of laying hen.

Introduction

In spite huge financial resources committed to breeding and development of commercial laying strains, the rearing environment still plays a significant role in the expression of their full genetic potential. Conducive rearing environment is fundamental to optimum metabolic, physiologic and endocrinological activities connected with the entire egg production process of laying strains. The Nigerian climatic environment is characterized by high environmental temperature and relative humidity typical of a tropical region (Yakubu *et al.*, 2007), which tend to exert deleterious effect on optimum performance of livestocks. Commercial laying strains in Nigeria are developed in temperate climates; these exotic strains are confronted with myriad of problems such as climatic stress, diseases, managerial among others in tropical environments, thereby limiting their productivity.

The aim of this present study was to evaluate effect of seasonal variation on egg production, incidence of mortality and cracked-egg of an egg-type strain.

Materials and Methods

A flock of 200 Lohman Brown pullets purchased at point-of-lay from a reputable hatchery farm at Ibadan was established at Teaching and Research farm of Bowen University, Iwo, Osun State. These birds were distributed randomly at the rate of two pullets per cage (battery cage) and were fed *ad libitum*. Besides, standard routine management practices were strictly adhered to throughout the experimental period. Iwo is situated at the northern fringe of tropical rainforest belt characterized with tropical climate of double maxima and dry season. The performance record was partitioned into four different seasons namely: early rainy season ERS (April–June), late rainy season LRS (July-September), early dry season EDS (October–December) and late dry season LDS (January–March). Parameters evaluated were hen-day egg production (%), incidence of mortality and cracked-egg.

Data collected for each variable were analyzed using analysis of variance procedure of Statistical Analysis Software (SAS, 1999), while the experimental model adopted was Complete Randomized Design of the same software. Seasonal means (±sem) separation was effected using least significance difference (LSD) at 5% significant level.

Results and Discussion

Highest egg production (69.17%) was recorded in EDS followed by 68.27, 66.43, and 58.24% for ER, LR and LDSs respectively. The least egg production recorded in LDS was significantly (P<0.05) different from values obtained in ER (68.27%) and ED (69.17%) seasons. Besides, hen-day egg production was found declining throughout ED and LDSs (Table 1).

Least hen-day egg production in LDS might not be unconnected with high environmental temperature in this period of the year in the study area. Studies show that laying performance of chicken plummeted during periods of elevated environmental temperatures (Mashaly *et al.*, 2004; Yakubu *et al.*, 2007). Another possible factor could be adduced to low feed intake, a common phenomenon in heat-stressed fowls. Such a decline in consumption will consequently impair hormonal equilibrium (Tanabe *et al.*, 1981; Vanmonfort *et al.* 1994) and physiological mechanisms associated with egg production. The aforementioned heat stress-induced hormonal and physiological dysfunctionality could also contribute to extended oviposition interval, hence low egg production.

The incidence of cracked-egg was highest in LDS (5.49%), approximately 83.22, 72.13 and 65% higher and significantly (P<0.05) different to values obtained for ERS (1.53%), LRS (1.47%) and EDS (1.92%) respectively (Table 1). It is interesting to note that incidence of cracked-egg continued to rise throughout the EDS months, reached a plateau in January (8.05%), decline in February and then picked up again in March.

High incidence of cracked-egg in EDS and LDS compared to records of ERS and LRS could partially be attributed to attendant synergetic effect of low feed intake and hormonal imbalance during heat stress. Reduced feed intake may result in insufficient consumption and availability of calcium (a vital mineral needed for good shell formation). In a recent study, Mashaly *et al.* (2004) reported significant decrease in plasma concentration of calcium when laying hens were heat stressed. Besides, Kohne and Jones (1976) and Mahmoud *et al*, (1996) also reported marked reduction in plasma level of calcium in adult female turkey and chicken hen respectively when they were raised under elevated ambient temperatures.

There was no significant (P>0.05) seasonal effect on incidence of mortality throughout the experimental period. However, highest mortality rate (3.59%) was recorded in hot LDS (Table 1). This is consistent with report of Yakubu *et al.* (2007) that significant higher mortality rate was recorded in hot-dry season compared with wet season but contradicts reports of Guobadia (1997) and Mmereole *et al.* (2007) who indicated that incidence of mortality were higher in wet season than in dry season. Guobadia (1997) submitted that higher incidence of mortality in wet season (April–October) may be attributed to high moisture content which tend to favour bacteria and parasitic infections. Highest mortality incidence in LDS could be linked to possible attendant effect of elevated rise in body temperature beyond physiological thermoneutral threshold thereby predisposing and reducing resistance of fowl to environmental 'stressors' such as pathological infections. Zulkifi *et al.* (2000) reported that keeping chickens in thermally stressed environment resulted in low antibody synthesis.

Consistent rise in mortality rates in EDS and LDS (with a slight decrease in February) is an indicative that as rearing environment was becoming drier, hotter and stressful in those seasons (due to low rainfall and relative humidity) mortality rate increases.

Conclusion

From the results obtained in this study, it is evident that effect of seasonal changes on laying hen was most pronounced in LDS months noted for high ambient temperature in the study area. Consistent decline in performance in all parameters evaluated throughout EDS and LDS suggested that prevailing environmental conditions in those seasons induced stress and exerted adverse effects on optimum performance of commercial laying hens.

References

Guobadia, E.E. 1997. The effect of seasonal variation on performance of egg type poultry: A case study of Mitchell farms, Monsogar, Delta state, Nigeria. *Nig. J. Anim. Prod.* 24 (2): 101-105.

Kohne, H.J. and Jones, J.E. 1976. The relationship of circulating level of estrogens, corticosterone and calcium to production performance of adult turkey hens under conditions of increasing ambient temperature. *Poultry Sci.* 55:277-285.

Mahmud, K.P., Beck, M.M., Scheideler, S.E., Forman, M.F., Anderson, K.P. and Kachman, S.D. 1996. Acute high environmental temperature and calcium-estrogen relationship in the hen. *Poultry Sci.* 75:1555-1562.

Mashaly, M.M., Hendricks, G.L., Kalama, M.A., Gehad, A.E., Abbas, A.O. and Patterson, P.H. 2004. Effects of heat stress on production parameters and immune response of commercial laying hens. *Poultry Sci.* 83:889-894.

Mmereole, F. U. C., Bratte, L. and Omeje, S. I. 2007. Genotype x season interaction effects on the laying mortality rates of the Nigerian local chicken, the Barred Plymouth Rock and their crosses. *International J. Poult. Sci.* 6(12): 892-894.

SAS, 1999. Statistical Analysis System User's guide. Statistics.SAS Institute Inc., Cary, NC27513, USA.

Tanabe, Y., Ogowa, T. and Nakamura, T. 1981. The effect of short-term starvation on pituitary and plasma LH, plasma oestradiol and progesterone, and pituitary response to LH – RH in the laying hen (*Gallus domesticus*). *Gen. and Compar. Endocr.* 43(3): 392 – 398.

Vanmonfort, D., Berghman, L.R., Rombatus, L., Verhoeven, G. and Decuypere, E. 1994. Changes in immunoreactive inhibin, follicle-stimulating hormone, luteinizing hormone and progesterone in plasma after short-term food deprivation and during ovulatory cycle of the domestic hen. *Gen. and Compar. Endocr.* 95(1): 117- 124.

Yakubu, A., Salako, A. E. and Ige, O. 2007. Effect of genotype and housing systems on the laying performance of chickens in different seasons in the semi-humid tropics. *International J. Poult. Sci.* 6(6):434-439.

Zulkifi, I, Norma, M.T., Israf, D.A. and Omar A.R. 2000. The effect of early age feed restriction on subsequent response to high environmental temperatures in female broiler chickens. *Poultry Sci.* 79:1401-1407.

Table 1. Mean percentage seasonal effect on performance of laying hen

Season		Parameters		
		Hen-day egg Production (%)	Cracked-egg (%)	Mortality (%)
Early rain	April	63 .89	1.77	1.02
	May	65.84	1.03	3.15
	June	75.08	1.80	2.70
	Mean ±sem	68.27± 4.87[a]	1.53±0.36[a]	2.29 ±0.92[a]
Late rain	July	70.84	1.34	1.09
	August	64.37	1.78	4.57
	September	64.08	1.29	3.55
	Mean ±sem	66.43± 3.12[ab]	1.47±0.22[a]	3.07±1.46[a]
Early dry	October	71.05	1.22	1.20
	November	69.94	1.77	1.83
	December	66.51	2.76	2.50
	Mean ±sem	69.17 ± 1.93[a]	1.92±0.64[a]	1.84±0.53[a]
Late dry	January	65.46	8.05	3.90
	February	57.66	3.26	1.32
	March	51.59	5.17	5.56
	Mean ±sem	58.24 ±5.68[b]	5.49 ±1.97[b]	3.59±1.74[a]

Means in the same column with different superscripts are significantly different ($P < 0.05$).

SEM= Standard error of the mean