

EFFECTS OF SEASONAL VARIATION ON LAYING PERFORMANCE OF BROILER BREEDER IN A DERIVED SAVANNA ENVIRONMENT IN NIGERIA

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Abstract

Seasonal variation is one of the most important factors influencing livestock production in Nigeria. Hence, eleven (11) month production records of Cobb 500 strain of broiler breeder birds on a commercial farm in Ibadan, Oyo State, Nigeria were analyzed to determine the effects of seasonal variation on their performance indices. Secondary data was used and performance parameters evaluated include egg production, feed intake and mortality. The records were grouped into rainy season (April - September) and dry season (October - March). Each season was further classified into two sub-seasons each: 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). Results of data analysis showed that seasons significantly ($P < 0.05$) influenced all the performance indices evaluated. The results of data analysis indicated that laying hens had highest performance with respect to egg production, daily feed intake and mortality in early dry season than in other sub-seasons but had least performance and suffered most the effect of seasonal variation in early rainy season in a derived Savannah environment of Nigeria.

Keywords: Laying strain, seasonal variation, egg production, feed intake, derived savanna.

Introduction

Poultry can be regarded as all birds of economic value to man, examples of which include chickens, pigeon, duck, quail, pheasant, guinea fowl and recently ostrich which all belong to the zoological class aves (Atteh, 2003). Poultry offer a wide range of uses to human which include: provision of egg and meat, research and medical purpose, production of manure which aid to improve the soil fertility, poultry birds' feathers provide aesthetic value to human (Atteh, 2003). The advent of exotic strains of chicken into the tropics has led to a tremendous change in poultry industry. It has encouraged establishment of more commercial poultry farms and at the same time resulted in significant increase in the output with respect to meat and egg compared to what is used to obtain under traditional system where native stock of unimproved varieties are being kept. However, despite huge amount of capital being invested on stock and other production activities, it is noteworthy that performance of exotic birds commonly employed for commercial purposes in tropical world is low compared to what is being obtained in their country of origin (temperate region).

Poultry production, like any other business is not immune to day-to-day constraints. Especially in developing countries situated in hot tropical environments, these include managerial ability, feed scarcity, high ambient temperature, disease incidence, competition with foreign poultry products, and poor government policies etc. However, high ambient temperature (HAT) has been suggested as one of the major threats to poultry production in the tropical environment and most especially in under-developed and developing countries where poultry farmers cannot afford the cost of modern artificial control of ambient temperature in poultry houses (Deeb and Cahaner, 2001). Climate change adversely affect poultry production by way of imposing stress on the homeostasis in the birds (Tiruneh and Tegene, 2018). The present study was therefore conducted to demonstrate effect of seasonal variation on performance of laying hens with respect to egg production, feed intake and mortality in the derived savanna environment of Nigeria.

Materials and Methods

Study location

The secondary data used for the purpose of this study was based on production records of year 2019/2020 of Zartech farm Limited, a reputable commercial poultry farm located in Ibadan, Oyo State, Nigeria. The study area lies in a derived Savanna agro- ecological zone in South Western Nigeria. The experiment lasted for a period of (11) months.

There are two major seasons: Wet/ rainy (April - September) and dry (October - March) seasons. However, in order to enhance precision in appraisal of seasonal effect on performance, the production season was further divided into four sub-seasons viz: 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).

Experimental birds and management

The experimental birds comprises of about 20,000 Female and 2,000 Male birds of Cobb 500 broiler breeder. They were received at point of lay and were distributed randomly in open pens and reared on deep litter system. The flock had unlimited access to fresh, clean and uncontaminated water and were fed pre-breeder diet prior the commencement of egg production, after which they were further fed broiler breeder diets till the end of experimental period. Hygienic practices were strictly observed in the farm and normal routine management practices and medication against infectious diseases, deworming and delousing among others were also carried out on the birds.

Performance parameters and weather records

Productive parameters evaluated were feed intake (g/bird/day), mortality and percentage hen- house egg production. All these variable were recorded daily. The production record collected was used to investigate the effects of seasons on egg production (hen-day), feed intake and mortality. Meteorological records for relative humidity, rainfall and ambient temperature during the experimental period were obtained from the Nigerian meteorological agency (NIMET) and are presented in Table 2.

Data analysis

Data collected were subjected to analysis of variance using statistical package; SAS (2005). Means among the variables were separated using Duncan's multiple range test at 5% level of significance of the same statistical package.

Results and Discussion

Seasonal variation is one of the key factors affection the production and performance of birds in Nigeria. Presented in Table 1 is the seasonal variation on the performance indices of the investigated egg type chickens. Seasons significantly ($P < 0.05$) influenced all the performance indices investigated. The highest egg production of (71.74%) was obtained in early dry season, followed by (65.65%) and (57.26%) in late rainy season and late dry season, respectively while 38.68% laid in early rainy season was the least and markedly ($P < 0.005$) different from egg production records of other sub-seasons.

The highest egg production (71.74%) and weekly hen house production percentage (0.33%) obtained in early dry season being a reflection of the peak period of egg production year in this study. Also, a reflection of the highest daily feed intake consumed. This is an indication that the broiler breeders were able to utilize what being fed with and this could be attributed to favourable environmental condition favouring low bacteria and parasitic infestation. This is because hot season tend to inhibit the growth rate of microbes hence, prevent the pathogenic and parasitic proliferation and infections unlike wet season which trigger the growth rate of microbes and parasites (Gunjan *et al* 2020). Similarly, it is very common that microbial proliferation and pathological infections rate in dry season might not be as high and virulent as commonly experienced in wet season (Gunjan *et al* 2020) due to unfavourable high environmental temperature and low relative humidity as revealed in Table 2 in this review.

The lowest egg production (38.68%) together with the least weekly hen house (0.16%) observed in ERS was actually a result of the early production stage which is a starting point of egg production in this study year with a very short interval between ERS and LRS month as showed in the table.

The highest body weight gain value of broiler breeder hen was obtained in late dry season being a reflection of the higher daily feed intake consumed. This indicate the fact that the broiler breeder hen were able to utilize what being fed with and this could be attributed to favourable environmental condition favouring low bacterial infection and as well as parasitic infestation (Musa *et al* 2022).

Mortality rate of breeder hen (1.24%) and cock (7.42%) was found to be highest in ERS compared to (0.19%) and (0.76%) recorded for laying hen and cock in EDS. The highest incidence of death in wet season ERS in this study was in agreement with previous studies conducted in controlled hot environments. (Guobadia, 1997) who reported higher mortality in wet season than in dry season in chicks (3-6 weeks) raised in humid tropical environment in Southern Nigeria. This was attributed to favourable environmental condition to bacteria infection and parasitic infestation. The least mortality (0.19%) observed in this study was in early dry season. The result obtained in this study contradicted the observation of Kyarisiima and Balnave (1996); Elijah and Adedapo (2006); Mmereole *et al.* (2007); Yakubu *et al.* (2007) and Oguntunji *et al.* (2008) who reported high mortality in laying hen

reared in hot season than those reared in cool environment with the claim that high mortality during dry season in their studies was due to deleterious effect of thermal stress.

Table 1: Seasonal variation on the performance indices of laying hens

abc Means along the same row with different superscripts are significantly different ($P < 0.05$)

Table 2: Meteorological parameters at Oluyole Local Government Area, Ibadan, Oyo State.

Year	Month	Rainfall (mm)	Min. Temp. (°C)	Max. Temp. (°C)	Relative Humidity (%)
2019	ERS(May-Jun)	9.22	23.47	31.43	82.76
2019	LRS (July-Sep)	8.13	22.57	29.46	86.17
2019	EDS (Oct-Dec)	6.97	23.00	32.39	76.83
2020	LDS (Jan-Mar)	2.70	23.52	36.73	58.82

Conclusion

This present study showed that seasonal changes had influence on the performance indices of laying birds. It demonstrates further that laying hens in early dry season had significant best performance with respect to feed intake, egg production, weekly hen house production and mortality rate. In

Parameters	SEASONS				SEM
	ERS May-June	LRS Jul-Sep	EDS Oct-Dec	LDS Jan-March	
Egg Production (%)	38.68 ^d	65.65 ^b	71.74 ^a	57.26 ^c	0.97
Weekly HH Production (%)	0.16 ^c	0.29 ^b	0.33 ^a	0.26 ^b	0.01
Average Hen number	1493.97 ^b	1649.12 ^a	1568.04 ^{ab}	1502.46 ^b	18.50
Hen Mortality (%)	1.24 ^a	0.32 ^b	0.19 ^b	0.62 ^{ab}	0.14
Average Cock number	137.66 ^c	190.15 ^a	161.07 ^b	147.85 ^c	2.28
Cock Mortality (%)	7.42 ^a	1.26 ^b	0.76 ^b	1.05 ^b	1.04
Hen/Cock	11.19 ^a	8.70 ^c	9.85 ^b	10.23 ^b	0.09
Hen: Daily feed intake (g)	164.59 ^a	161.33 ^b	166.53 ^a	165.40 ^a	0.49
Hen: Body Weight gain (g)	4041.10 ^{ab}	3514.10 ^b	3806.90 ^{ab}	4338.40 ^a	92.72
Cock; Daily feed intake (g)	135.75 ^a	119.89 ^d	130.64 ^c	134.45 ^b	0.37
Cock; Body weight gain (g)	5056.40 ^a	3918.29 ^d	4456.67 ^c	4855.92 ^b	24.41

similar vein, sub-season performance evaluation was poorest in the major parameters evaluated in early rainy season. The characteristics poor performance of the investigated broiler breeder hens in early rainy season is a pointer to the need to orientate poultry farmers on the need for dietary, prophylactic and managerial manipulations in early rainy season in order to minimize adverse effects of change in season on performance of their flocks.

References

- Atteh, J.O. 2003. Romancing the chicken 68th Inaugural lecture, University of Ilorin Published by University Press.
- Deeb, N. and Cahaner, A. 2001. Genotype-by-Environment interaction with broiler genotypes differing in growth rate.1. The effects of high ambient temperature and naked-neck genotypes on lines differing in genetic background. *Poultry Science*. 80: 695-702.
- Elijah, O.A. and Adedapo, A. 2006. The effect of climate on poultry productivity in Ilorin, Kwara State, Nigeria. *International Journal of Poultry Science*. 5(11): 1061-1068.

- Gunjan, S., Richa T., Negi, G.C. 2020. Problems associated with poultry in the rainy season. Poultry punch. English Monthly Magazine. August 19, 2020.
- Guobadia, E.E., (1997). The effect of seasonal variation on performance of egg-type poultry: A case study of Mitchell Farms, Mosogar, Delta State, Nigeria. *Nigerian Journal Animal Production*, 24 (2): 101-105.
- Kyarisiima, C. C. and Balnave, D. 1996. Influence of temperature during growth on responses of hens to high or low temperature during lay. *British Poultry Science*: 37: 553-562.
- Mmereole, F.U.C., Bratte, L. and Omeje, S.I. 2007. Genotype and season interaction effects on the laying mortality rates of the Nigerian local chicken, the Barred Plymouth Rock and their crosses. *Int. J. Poultry Sci.* 6 (12): 892-894.
- Musa, K.A. 2022. Effects of seasonal variation on laying performance of broiler breeder. B.Agic thesis submitted to Animal Science and Fisheries Management, Bowen University, Iwo, Osun State, Nigeria
- Nimet: Nigerian meteorological agency 2022.
- Oguntunji, A.O., Aderemi, F.A., Lawal, T.E. and Alabi, O.M. 2008. The Influence of seasonal variation on performance of a commercial laying strain in a derived savanna environment in Nigeria. *Nigerian Poultry Science Journal.* 5(2): 67-74.
- SAS. 2005. The Statistical Analytical System (SAS/STAT) computer software. Version 2005, SAS Institute incorporated, N.C; USA.
- Tiruneh, S. and Tegene, F. (2018) Impacts of climate change on livestock production and productivity and different adaptation strategies in Ethiopia. *Journal of Applied and Advanced Research* 3(3):52–58 DOI: 10.21839/jaar.2018.v3i3.150
- 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 Journal of Poultry Science.* 6(6): 434-439.