

EFFECTS OF SEASONAL VARIATIONS ON FERTILITY AND HATCHABILITY OF ABOR ACRE PLUS BROILER BREEDERS BIRDS IN THE TROPICS

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ABSTRACT

This study was conducted to evaluate the effect of seasonal variation on fertility and hatchability of Abor-acre-plus broiler-breeder eggs. Data were collected in a renowned research-based Hatchery in Ibadan, Oyo state. The meteorological data were collected from Nigerian Meteorological Agency (NIMET), data Management Unit (DMU) at Abuja. The data collected were plotted into four sub-season; late dry season LDS (Jan.-Mar.), early rainy season ERS (April-June), late rainy season LRS (Jul.-Sept.) and early dry season EDS (Oct. - Dec.) respectively. Data were collected on the egg set, fertile egg, percent fertility, broiler chicks, percent hatchability, hatching rejects and percent of egg set and this was subjected to analysis of variance (ANOVA) for complete randomized design (CRD) using statistical package of SAS 2005 and means with significant difference ($p < 0.05$) among variables were separated using Duncan multiple range test. The early rainy season had the highest means of 87.87% for percent fertility, this was as a results of increase in relative humidity of that sub-season according to meteorological report thus making it potentially the favorable season for having good percent fertility across the season. Higher percent hatchability of 90.61% was recorded in the late rainy. It was concluded that the best fertility and hatchability were in the early and late rainy sub-season respectively. It is hence recommended that farmers can explore these sub-seasons or technologically mimic the environmental conditions as both fertility and hatchability for good performance of broiler breeder eggs because they are environmentally influenced.

Keywords: Abor-acre-plus, broiler breeder, fertility, hatchability, sub-seasons

Introduction

Domesticated birds such as chicken, quails, turkey and geese with the purpose of raising them for meat, egg production as well as faecal dropping and feathers as natural unprocessed materials known as poultry farming are very important to human life (Stiles, 2017).

Poultry Production in Nigeria amounts up to 454 billion tonnes of meat and 3.8 million eggs per year with a standing population of 180 million birds. Nigeria is the second largest chicken producer after South Africa (FAOSTAT 2017). About 80 million chickens were raised in intensive systems, 60 million semi-intensive systems and the remaining 40 million in extensive systems ASL 2050 (2018). The poultry groups constitutes more than 57% of the total livestock products in Nigeria (Alabi and Osifo, 2004) and many people have gone into poultry production either for producing egg, meat or both (Ofioku and Aijeh, 2005).

Fertility is the percentage of incubated eggs that are fertile whilst hatchability is the percentage of fertile eggs that hatched into chicks. For the hatchability traits, breed has little or no effect on hatchability of poultry eggs, though, it has been reported that light breeds have higher hatchability than heavy breeds (King'ori, 2011). Heritability estimates for fertility and hatchability in chickens ranging from 0.06 - 0.13 (Sapp *et al.*, 2004; Adeyinka *et al.*, 2004).

For better fertility and hatchability of a fertile egg in order to curb embryo death, some elements such as hatchery hygiene (biosecurity) and nutrition have to be focused because that is the key. Fertile eggs has to be examined thoroughly in the farm/hatchery before being set so that deformity eggs could be separated. The deformed eggs such as crack/hairline crack, shell less, blood stain, wrinkle shape eggs, pee-wee, dirt/soil egg; all this and many more have impacts on the hatchability of the poultry eggs in that it encourages growth of microorganism in the midst of the healthy hatch-able eggs because physical characteristic of hatch-able eggs influence hatchability

There are environmental conditions affecting fertility and hatchability of a poultry breeder birds and are as follows; High ambient temperature are the determinants of the productivity in broiler breeder

flocks because it lower fertility as a result of poor quality semen produced from heat stressed cocks used for mating or artificial insemination or inability to release viable ovum and effectively store spermatozoa in the semen storage tubules (SST) in the reproductive tract (Mc Daniel *et al.*, 1995, Abioja *et al.*, 2006). The age of the broiler and layer breeder birds and its weight influences the fertility and hatchability (Narushin *et al.*, 2010). This study was conducted to evaluate the effect of seasonal variation on fertility and hatchability of Arbor-acre-plus broiler-breeder eggs.

Materials and Methods

Experimental Location: The experimental data was taken from a renowned research-based hatchery and breeder farm in Ibadan, Oyo state.

Experimental birds: The breeder birds were the parent stock of Chi® Company products (Ajanla farm) at 20km Lagos- Ibadan expressway and they were of two batches. The mating ratio of the birds was 1 male to 8 female. The broiler breeder birds were raised from brooding stage till laying period at about 24 weeks of age but started setting their eggs at 27 weeks of age.

Hatchery Condition: Breeder eggs were taken to the hatchery on a weekly basis and thereafter setting is done before incubation started. Standard Environmental temperature (SET) for temperature and humidity are observed at 99.5° F and 85° F for setter and hatcher at 98.5°F and 88° F-92°F respectively. Eggs were turned hourly automatically and candling done at 18th day to determine infertile eggs and dead embryo respectively.

Data collection: Data collected from the renowned research based hatchery at Ibadan were egg sets, fertile eggs, hatching chicks, hatching rejects, percent hatchability and of egg set. Meteorological data were collected too from Nigerian Meteorological Agency, Data Management unit at Abuja.

Statistical Analysis: Data collected were subjected to analysis of variance using a statistical package SAS 2005 and significant differences were found among the sub-season and means among variables were separated using Duncan multiple range test. Statistical significance was assessed at ($p < 0.05$).

Results and Discussion

Presented in table 1 and Figure 1 is the effect of seasonal variation on the fertility and hatchability of Arbor acres plus broiler breeder eggs. Seasonal variation significantly ($p < 0.05$) influenced the fertility and hatchability of Arbor acre plus. Egg set shown no significant difference across the sub-seasons. However, the fertile eggs had significant difference as a result of relative humidity on the increase and probably the roosters are at the prime of their sexual activity. Percent egg fertility was seasonally influenced probably of weather favourable to relative humidity which complemented egg fertility stability in the incubator compared to other seasons. Percent hatchability shown significant difference across the rows and comparable to report of Zakaria *et al* 2005. The late rainy season showed increased hatchability than early rainy season based on relative humidity of data management unit (DMU).

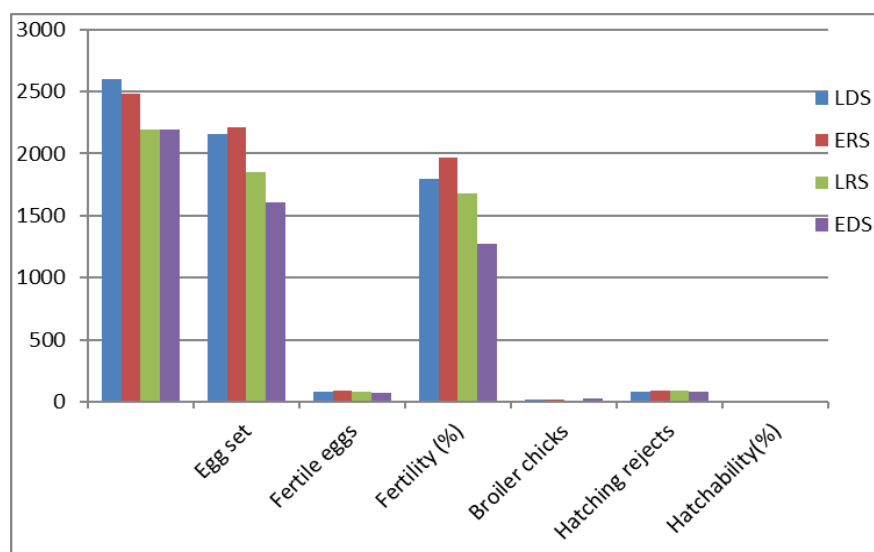
Table 1: Effects of seasonal variation on the fertility and hatchability of Arbor acre plus broiler breeder egg in the tropics

PARAMETERS	SEASONS				
	LDS	ERS	LRS	EDS	SEM
Period	Jan. –Mar.	Apr. –June	July–Sept.	Oct. – Dec.	
Egg set	2597.2 ^a	2484.4 ^a	2189.7 ^a	2190.4 ^a	77.94
Fertile eggs	2156.0 ^a	2213.5 ^a	1853.8 ^{ab}	1603.5 ^b	75.61
Fertility (%)	82.62 ^b	87.87 ^a	82.76 ^b	72.04 ^c	0.82
Broiler chicks	1795.1 ^a	1969.9 ^a	1676.3 ^a	1274.4 ^b	69.84
Hatching rejects	15.44 ^b	12.92 ^b	9.04 ^b	24.29 ^a	1.26
Hatchability (%)	83.52 ^b	88.74 ^a	90.61 ^a	81.66 ^b	0.53
Percent Egg set	68.65 ^{ab}	82.87 ^a	74.99 ^{ab}	58.93 ^b	9.96

^{a, b, c} Means across rows with different superscripts are significantly ($p < 0.05$) different

LDS-Late dry season, ERS- Early rainy season, LRS- Late rainy season, EDS-Early dry season

Fig 1: Graphical representation of seasonal variation on the fertility and hatchability of Arbor acre plus broiler breeder egg in the tropics



REFERENCES

- Abioja, M.O., Williams, T.J., Osinowo, O.A. 1smith, O.F. and Erubetine, D. (2006). Effects of temperature and humidity in different months of lay on egg fertility and hatchability in broiler breeder hens reared in Sapele, Nigeria.
- Adeyinka, I. A., Adejoh, E., Abubakar, B. Y., Sekoni, A. A. and Abeke, F. O. (2004). Genetic parameter estimates of body weights and linear measurements in a population of naked neck broiler chickens. *Proc. Nig. Soc. Anim. Prod.*, 29: 40-43.
- Alabi, R.A. and Osifo B.A. (2004). Contributory role of Animal production in National development Proc. Of the 9th ASAN Conf. 13th Edition. Ebonyi State University, Abakaliki, Nig. Pp: 177-180
- ASL (Africa Sustainable livestock) 2050. (2018). Livestock production systems spotlight Nigeria. FAO, Rome, Italy.
- FAOSTAT (2017). Food and Agricultural Organization of the United Nations. www.fao.org/faostat/en/#data/QA
- King'ori, A.M. (2011). Review of the factors that influence Egg fertility and hatchability in Poultry. *International Journal of Poultry science* 10 (6): 483-492. ISSN: 1682-8356.
- Mc aniel, Christopher D.; Bramwell, R. Keith; Wilson, Jeanna I. and Howarth, Birkett Jr. (1995): Fertility of Male and Female Broiler Breeders Following Exposure to Elevated Ambient Temperatures. *Poultry Science* 74:1029-1038
- Narushin, V.G. and Romanov, M.N. (2002). Egg physical characteristics and hatchability. *World's Poult. Sci. J.* 58: 297-303
- Ofioku, A.U. and Ajeh, P.C. (2005). Sources of manipulation of dietary fibre content. *Brit. Poult. Information on animal health management among Sci.* 17: 142-147. Poultry farmers in Delta State.
- SAHEL (2015). An Assessment of the Nigerian Poultry Sector <http://sahelcp.com/anassessment-of-the-nigerian-poultry-sector/>. SAHEL 11: 1-3.
- Sapp, R.L., Rekaya, R., Misztal, I. and Wing, T. (2004). Male and female fertility and hatchability in chickens. A longitudinal mixed model approach. *Poult. Sci.*, 83: 1253-1259.
- SAS (2005). The Statistical Analytical Systems (SAS/STAT) Computer Software. Version 2005, SAS Institute incorporated, N.C., USA.
- Stiles, W. (2017). Poultry manure management. Available at: https://www.researchgate.net/publication/321001761_Poultry_manure_management/stats. Accessed on the 15th March 2020.
- Zakaria, A. H. Plumstead, P. W., Romero-Sanchez, H., Leksrisonpong, N., Osborne. J. and Brake. J. (2005). Oviposition Pattern, Egg Weight, Fertility, and Hatchability of Young and Old Broiler Breeders. *Poultry Science*. 84:1505–1509.