SSRG International Journal of Agriculture and Environmental Science
ISSN: 2394 – 2568 /doi:10.14445/23942568/IJAES-V8I2P106

Volume 8 Issue 2, 35-39, Mar-April 2021

Effects of Seaons And Production of Poultry Egg In Owerri Urban South-Eastern Nigeria

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Abstract: *The study examined the effects of seasons and poultry egg production in Owerri urban, South-eastern Nigeria. The work, as a result, focused on the effects of seasonal variability on poultry egg production. Quasi-experimental research design was employed in the study. Climatological data on rainfall, temperature, relative humidity, and eggs produced was collected from Nimet, Sam Mbakwe International Cargo Airport, Imo State, and Ministry of Livestock Development Owerri, respectively, for a period of 16 years (2004-2019). Results show that poultry egg production positively correlated with rainfall (0.870) and an R^2 of 75.5%, implying higher production of poultry eggs in the rainy seasons. The trend analysis revealed seasonal variability in poultry egg production across seasons of the year for the span under study (2004-2019). In conclusion, seasons of the year have effects on poultry egg production in the study area within the period under investigation. It is recommended that farmers should treat appropriately stock birds for enhanced air movement and space.*

Keywords: *Egg, Poultry, Production, Season, Variability.*

I. Introduction

Poultry is birds such as the domestic fowl, Turkey, Duck, Gesse, Ostrich, etc., which render not only economic services but contributes significantly to human food as a primary supplier of meat, egg, and raw materials to industries (feathers, waste production). It also serves as a source of income and employment to people compared to other domestic animals, and their production is one that plays a significant contribution to food for human consumption (Demeke, 2004). Poultry flocks are particularly vulnerable to climatic variations because there is a range of thermal conditions within which animals are able to maintain a relatively stable temperature (Adesiji, Baba, and Tyabo, 2013). Poultry is a primary supplier of eggs and meat and as a source of income and employment as well as socio-cultural values (Naazie and Canacoo, 2007). China is the world's largest egg producer with 42 percent of global production, followed by the United state (7 %) and India (6 %) (Faostat, 2005). In the Arab world alone, over 22 billion eggs are produced annually, which accounts for over 2.5% of the total world production of eggs (Faostat, 2005). The middle east has gone through rapid growth in the poultry sector during the last two decades. In the Arab world alone, over 22 billion table eggs are produced annually, which accounts for 2.5% of the total world production of table eggs(Morocco, Algeria, Egypt, and Syria being the highest producers (Dahgir, 2008). Poultry meat production in these countries amounted to over 2500 thousand tonnes in 2005, with Saudi Arabia in the lead (Freji,2005). Poultry consumption in the middle east reached 4.7millon metric tonnes in 2005 in comparison with 4 .5 million metric tonnes in 2003, whereas the main production countries were Saudi Arabia, Jordon, Lebanon, Iran, and Egypt (Mahjoor, 2013).

In Nigeria, there are two seasons, dry and rainy seasons. The rainy season begins in April and lasts till October, whereas the dry season begins in November and lasts till March (Odekunle, 2004). These seasons have their various effects not only on living things, poultry inclusive but also on non-living things (Osaguona *et al.*, 2007). The primary impact of seasonal variation from summer into fall in the temperate region is a reduction in egg production. Chickens are stimulated to lay eggs by daylight. Long days and increasing day length encourage egg production. A declining and short day length will result in reduced egg production in most birds compared to their standard production. In a tropical environment, conditions affecting the performance, productivity, and health of birds include temperature, relative humidity, rainfall, and sunshine prevailing at a given time which affects livestock productions that contribute significantly to the human source of food (Demeke, 2004; Elijah and Adedapo, 2006). Poultry performance is not only dependent on inherited capacity but also high on the environment as climatic variations have an effect on poultry feed intake, which invariably affect the production of meat and egg and also encourages the outbreak of poultry diseases (Elijah and Adedapo, 2006). Variability in climate elements poses a serious risk to farmers due to uncertainty surrounding farm system planning and management (FAO, 2010). Therefore this study was carried out to investigate if the seasons of the year have an effect on the production of poultry eggs in the study area.

II. Materials and methods

Study location

Owerri, the Imo State capital, lies at the intersection of six major roads of regional importance, namely: Aba road, Okigwe road, Mbaise/Umuahia road, and Orlu road. It is located within latitude 5°25'10N and 5°30'15N and longitude 7°10E and 7°40'E and occupies a land area of about 104 square kilometers. It lies within the humid tropical climate with annual rainfall and temperature of over 2000 mm and 20ºC, respectively. And occupies a land area of about 104 square kilometers.

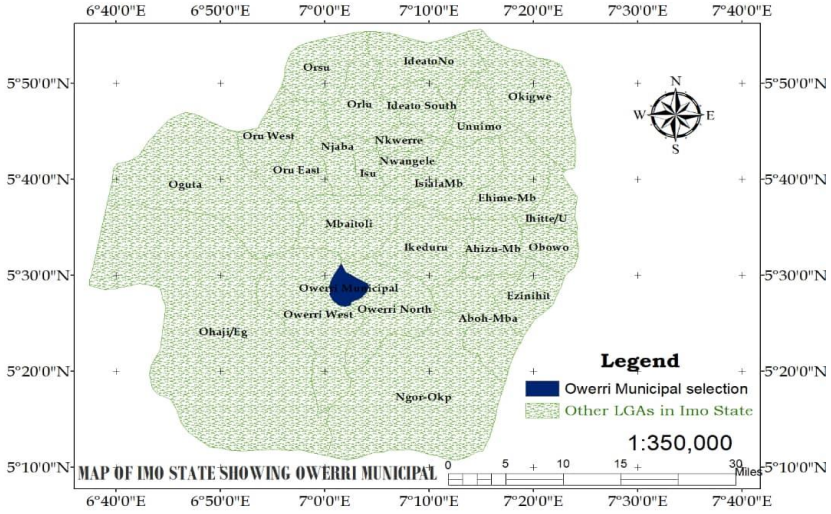

Figure 1: Map of Imo State showing the study area.

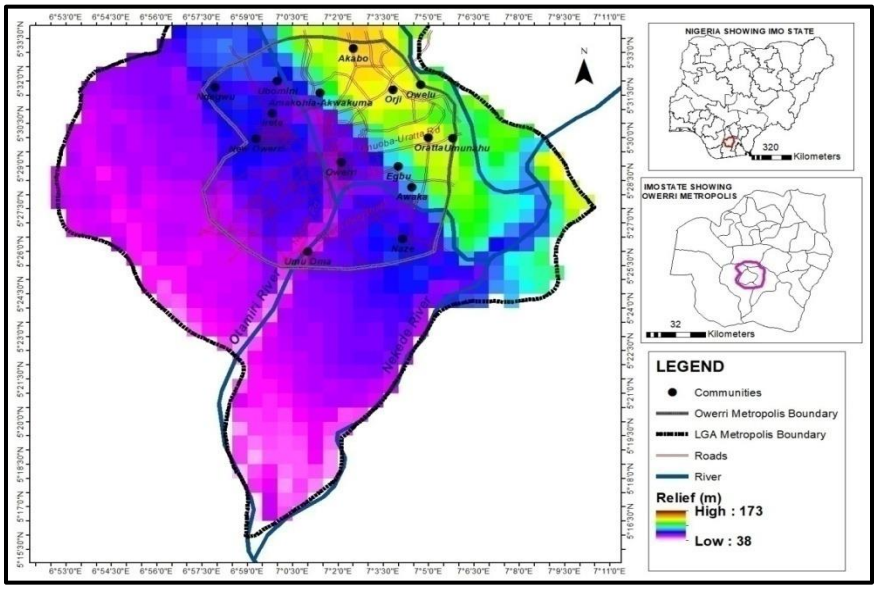

Figure.2: Relief and Drainage Map of the study area.

Method of data collection

The study employed a quasi-experimental research design. Data for rainfall, temperature, relative humidity, and the number of egg produced was collected from Nigerian Meteorological Agency (NIMET) Sam Mbakwe, International Cargo Airport Imo State, and Ministry of Livestock Development Owerri for a period of 16 years, respectively. Data were analyzed statistically using Pearson's moment correlation, stepwise regression, and linear regression to ascertain variations in egg production across seasons of the year from (2004-2019). The analysis was done using a statistical package for social sciences SPSS version 21.

III. RESULTS AND DISCUSSION

Table 1 shows monthly climatic data of maximum temperature, minimum temperature, mean temperature, relative humidity, total rainfall, and number of eggs produced.

Table 1: Monthly climatic data and poultry egg between 2004-2019

Months	Max Temp (^{0}C)	Mini Temp (^{0}C)	Mean Temp (^{0}C)	Relative humidity (%)	Total rainfall (mm)	Number of eggs produced
JAN.	31.7	18.1	24.9	56.6	22.1	2245.5
FEB.	34.4	22.9	28.7	68.9	40.2	2505.6
MARCH	34.7	21.9	28.3	76.3	85.6	3634.0
APR.	33.8	23.3	28.6	71.4	168.4	3759.2
MAY	32.4	23.1	27.7	80.6	272.5	3905.3
JUN	32.6	22.7	27.6	85.6	296.5	4230.5
JUL	30.1	22.6	26.4	87.3	342.7	4267.0
AUG	30.0	22.4	26.5	85.4	359.7	4393.0
Sept	31.5	22.6	26.8	85.2	339.1	3747.9
OCT.	31.7	22.6	27.2	79.1	219.6	3716.0
NOV.	32.9	21.3	27.1	69.9	55.6	3192.4
DEC.	33.5	21.0	27.2	69.4	42.6	2931.7

Source: Author's computation 2020.

The mean temperature, relative humidity, total rainfall, number of eggs produced, number of meat produced show variability across months of the seasons, which have effects on poultry production in Owerri urban south-eastern Nigeria. The months of the dry season (November-March) shows mean temperatures of 27.1℃, 27.2℃, 24.9℃, 28.7℃, 28.3℃ with a decline in egg production as follows 31924, 2931.7, 2245.5, 2505.6 and 3634.0. While the months of the rainy season (April-October) shows mean temperatures of 28.6℃, 27.7℃, 27.6℃, 26.4℃, 26.5℃, 26.8℃ and 27.2℃ with higher egg production at 3759.2, 3905.3, 4230.5, 4267.0, 4393.0, 3747.9, and 3716.0 number of eggs produced. Relative humidity revealed higher percentage in the months of rainy season (April-October), as follows 71.4%, 80.6%, 85.6%, 87.3%, 85.4%, 85.2% and 79.1%. While the months of the dry season (November-March) show 69.9%, 69.4%, 56.6%, 68.9%, and 76.3%. Also, relative humidity in the months of the rainy season (April-October) concise with months of increased egg production in the study area.

A. Effects of season on poultry egg production

Rainfall which is an indicator of the season (rainy season), revealed a positive correlation of 0.870 with poultry egg. While temperature and rainfall indicate a weak correlation of -0.740, which shows the lower the temperature, the higher the rainfall. A stepwise regression model was carried out to ascertain which predictor variable has more effect on poultry egg production. The regression model obtained shows an R-squared value of 0.757. This implies that (0.757*100) 75.7% of the variations in the total number of eggs produced per month is determined by rainfall

Table 2: Regression model summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate	Durbin-Watson
1	.870[a]	.757	.732	6359.71799	1.230

a. Predictors: (Constant), Rainfall measured over the months
b. Dependent Variable: The total eggs produced by the poultry over the months

Table 3: Anova for the regression model

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1258491725.764	1	1258491725.764	31.115	.000[b]
	Residual	404460129.153	10	40446012.915		
	Total	1662951854.917	11			

The regression model obtained in table 2 is statistically significant since the Sig. The value of 0.000 in table 3 is not greater than the alpha level of 0.05. We, therefore, conclude that rainfall has more effect on egg production in the study area within the years under consideration. The stepwise regression model obtained from the statistically significant regression coefficient is as follows: number of eggs produced = 38277.623 + 4.876 *rainfall + error

B. Trends of seasonal variations in poultry egg production

The trend analysis shows seasonal variation in poultry egg and meat produced for the months of January and July for the span under investigation. The months of January represent the dry season, while the months of July represent the rainy season for a period of sixteen years (2004– 2019). The mortality plot also was used to access outbreaks of poultry disease.

Figure.3 and figure.4 indicates the trend analysis for monthly egg production for January and July for all the years under investigation.

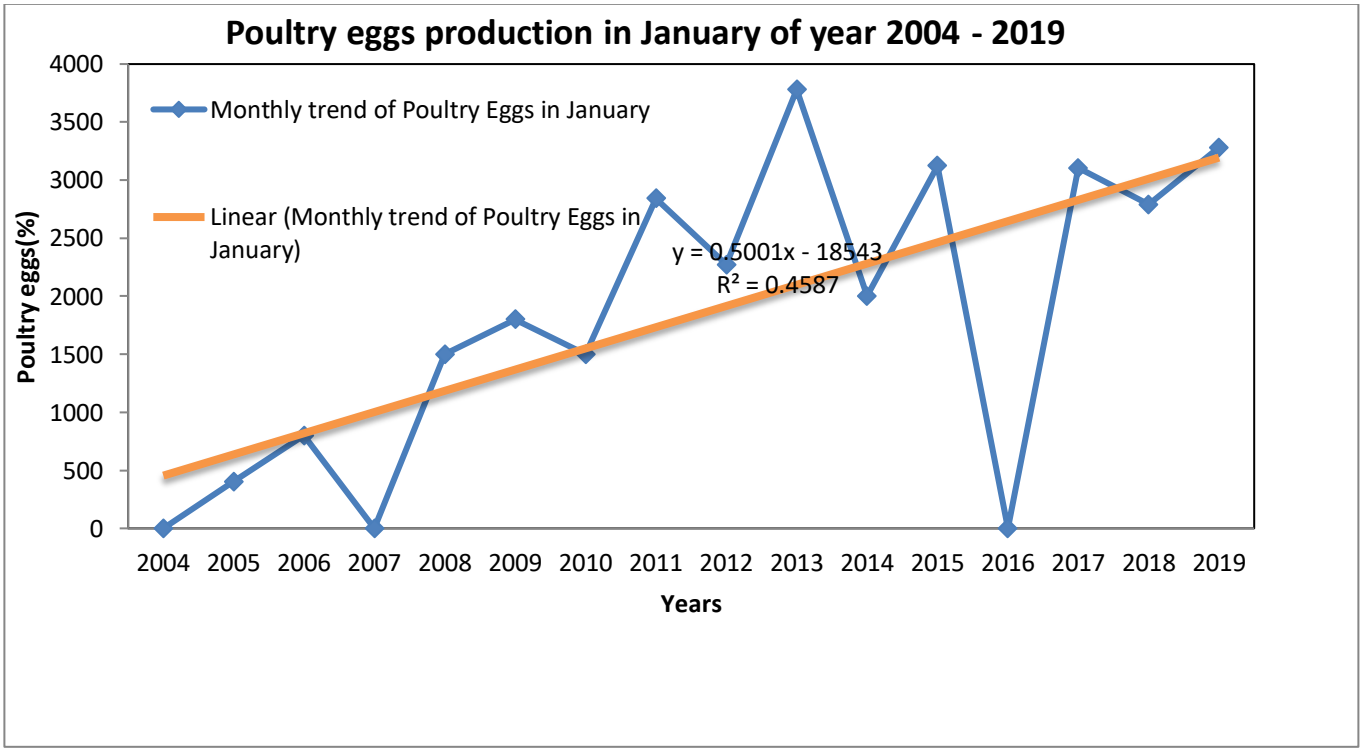

Figure 3: Trend analysis of Poultry egg productions in the month of January for all the years

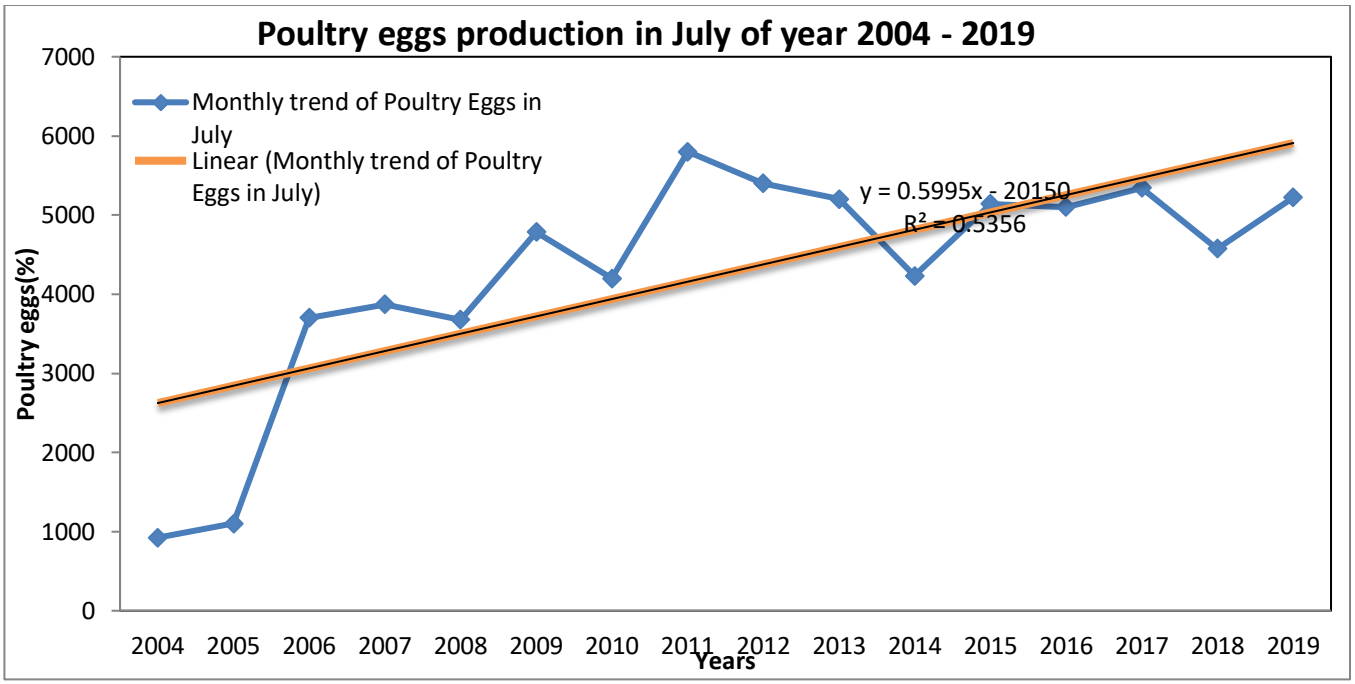

Figure 4: Trend analysis of Poultry egg productions in the month of January for all the years.

The trend analysis in figure 3 (January) and figure 4 (July) shows an upwards and steady increasing trend in egg production in July for the years under study. At the same time, January shows a gradual increasing trend in poultry egg production for the years under investigation. The months of January revealed a trend equation of y=0.500x – 18543 with an R^2 of 0.458, while the months of July revealed a trend equation of y=0.0599x – 20150 with an R^2 of 0.535. The trends revealed seasonal variation in poultry egg production across the seasons of the year for the period under study.

Conclusion: The correlation analysis on effects of seasons of the year on poultry egg production was carried out, the correlation between temperature, relative humidity, rainfall, and poultry egg, revealed a positive correlation of (0.870) with rainfall which is an indicator of season. This implies that poultry bird yield more eggs in the rainy season. The coefficient of determination (CD) obtained, which is in percentage implies 75.7% of the variations in the total number of eggs produced per month, is explainable by rainfall which is an indicator of the rainy season. This submission agrees with Gezahegn *et al. (*2018) that is, in the cold seasons, birds perform best compared to other seasons. It is recommended that the following points be taken into consideration. There is a need for the adoption of proper roofing methods, appropriate stocking of birds for enhanced air movement and space, and maintaining good sanitation/hygiene practices to minimize heat and the occurrence and spread of diseases that may adversely affect birds across seasons.

COMPETING INTERESTS: Authors have declared that no competing interest exists.

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