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Effect Of Change In Ambient Temperature And Relative Humidity On The Performance Of Indigenous Chicks (Gallus Gallus) Reared In Niger Delta, Nigeria

Kperegbeyi J. I
Department of Animal Production, Faculty of Agriculture, Delta State University of Science and Technology, Ozoro

Meye, J. A
Department of Fisheries Technology, Faculty of Agriculture, Delta State University of Science and Technology, Ozoro

Abstract:

Background and Objective: ***Most people believe that indigenous chicken production is not profitable and hence there is no need to invest in it. These beliefs are based on the knowledge that indigenous chickens grow slowly and take longer time to reach maturity and that their productions are usually low. However, indigenous chickens have played and are still playing their role in meeting the animal protein needs of over 70 percent of the populations who dwell in the rural areas of Nigeria. The study was conducted at the Delta State University of Science and Technology, Ozoro, to determine the effect of change in ambient temperature and relative humidity on the performance of indigenous chicks.***

Materials and Methods: ***Three strains of indigenous chicks; normal feathered, frizzle feathered and naked necks birds were used for this experiment. Parameters considered were quantitative traits (feed intake, body weight and body linear measurements) and day weather index (ambient temperature and relative humidity) for the three different strains. A total of one hundred and fifty (150) day - old indigenous chicks made up of three genotypes were used in the study. The experimental design used was Complete Randomized Design (CRD). Daily ambient temperatures, relative humidity and mortality were recorded. Determination of feed and body weight changes were calculated. Water and feed were given ad-libitum. Data collected were subjected to analysis of variance.***

Results: ***The results revealed the following prevailing atmospheric conditions - the mean daily ambient temperature and relative humidity value of 34.28 ^{0}C and 96 % respectively were obtained throughout the period of the study. The results also indicated that significant differences ($P<0.05$) existed among the three genotypes in all parameters studied. Mortality was highest (7.05 %) in normal feathered birds, (6.13 %) for frizzle feathered birds and 5.50 % least for naked neck. Body weight values ranged from 28.09 g to 158.13 g for normal feathered, 24.27 to 152.50 g for frizzle feathered and 30.31 to 203.95 g for naked neck birds were obtained at 6 weeks of age. R^2 values indicate that the analysis of variance accounted for 0.2, 1, 1.3, 2.2, 3.5 and 1.4 per cent of the variance in comb, neck, wing, keel length, thigh length and mortality respectively.***

Conclusion: ***According to results it was noted that lack of environmental condition control with high stocking density added to high ambient temperature and very high relative humidity. These conditions denote a situation of chronic heat stress which has strong impact on growth and physiology of birds' performance which gives by consequences, low scale weight and high mortality rate. Therefore, it was concluded that the performance of indigenous chickens under these environmental factors was low.***

Keywords: ***Relative humidity, ambient temperature, indigenous chicken, feed intake, body weight, performance.***

I. INTRODUCTION

Most people believe that indigenous chicken production is not profitable and hence there is no need to invest in it. These beliefs are based on the knowledge that indigenous chickens grow slowly and take longer time to reach maturity and that their productions are usually low. However, indigenous chickens have played and are still playing their role in meeting the animal protein needs of over 70 percent of the populations who dwell in the rural areas of Nigeria. They are also used as source of income (Akanji *et al.*, 2003 and Abeke *et al*, 2009). Much can be achieved in indigenous chicken production if adequate care is taken to handle the climate change that affect the production process as well as adoption of some level of easy- to- practice technology. One of such easy-to-practice technology is the control of ambient conditions. Indeed improved ambient conditions hold the key to the success of indigenous chicken production. This is because over 50 % of losses incurred are due to mortality especially during the early stages of chicks' life (FAO, 2004; Fairchild, 2004). These losses usually occurred due to high temperature and relative humidity, cold, disease, poor feeding, predators (from cats' and hawks), theft, trampling and drowning etc.

Effective temperature and relative humidity control ensure that the chicks are well protected from harsh weather, they are well fed and adequate healthcare provided in such a way that their survival is enhanced. The result will be the production of healthy starting pullets and cockerels with a promising future.

Unfortunately, due to global climate changes, the indigenous chickens and other farm animals' producers decried that high temperature and relative humidity experienced by their flock had caused high mortality rate and lower their productivity. The objective of this study therefore is to determine the effect of changes in ambient temperature and relative humidity on the performance of indigenous chick as reared in Niger Delta and proffer solutions.

II. MATERIALS AND METHODS

The study was conducted at the Poultry research center (PRC) situated in the school farm, Delta State University of Science and Technology, Ozoro. It falls within the rain forest vegetation zone of mid-western Nigeria on Latitude 5^0 32^I N and Longitude 6^0 15^I E of the Greenwich meridian The area is characterized by a humid climatic condition with annual rainfall value ranging between 2500 and 3000 mm. The mean temperature and relative humidity values are 34^0C and 96 %, respectively (DSUST Meteorological Station Ozoro, 2021).

A total of one hundred and fifty (150) day – old indigenous chicks consisting of fifty (50) each of normal feathered (NF), frizzle feathered (FF) and Naked neck (Nn) were used for this study. The chicks were purchased from Abeokuta hatchery in Ogun State, Nigeria.

The birds received the necessary medical attention throughout the experimental period. Routine hygiene was practiced by provision of clean water, dry feed; regular cleaning of the house, careful physical examination of the chicks was carried out every day so as to quickly detect abnormal behaviour, signs of symptoms of any disease conditions. Sick chicks were isolated and dead chicks removed and buried and visitors to the poultry house were highly restricted.

The chicks were fed commercial chicks mash. Feed and water were given *ad libitum.* The crude protein (CP) content was 20% and the energy (ME) content value was 2640 kcal/kg. The experimental period was eight (6) weeks (April 1st – May 14th 2019). At the commencement of the experiment, the chicks were weighed to obtain their initial weights. The experimental deign used was Complete Randomized Design (CRD). Daily temperature and relative humidity values were recorded with digital thermometer and hygrometer respectively. Mortality was also recorded. These were done thrice daily (8.00 am, 12.00 noon and 5.00 pm). Body weight and linear body measurements taken weekly for each of the sample birds include: comb length (CL), neck length (NL), wing length (WL), keel length (KL), Breast girth (BG), Thigh Length (TL), Shank Length (SL), toe length (TL) and body weight (BWT). Body weight values were taken using a platform scale while linear body measurements were taken according to the methods described by Solomon 2009 using fibre tape calibrated in centimeters (cm). Descriptions of how linear body measurements were taken are as follows.

- ✓ *Comb length (CL):* Total length of part of the head the comb covered.
- ✓ *Neck Length (NL):* This is the length of the axial skeleton from the first to the last *cervical vertebrae.*
- ✓ *Wing Length (WL):* The length between the scapula and the tip (second *digits phalanges*) of the wing.
- ✓ *Keel Length (KL):* Taken as the length of the sternum or breast plate.
- ✓ *Breast girth (BG):* This was taken as the circumference of the breast around the deepest region of the breast. A tape rule was used in taking the measurement. Thigh length (THL) Measured as the distance between the hock joint and pelvic joint.
- ✓ *Shank Length (SL):* Measured as the distance between the mid region of the *Genus* and that of the *Regiotarsalis.*
- ✓ *Toe Length (TL):* The length between the hind region of *RegioTarsalis* and the outside of the *Digital Tedis* (Mid digit) (Molenaar, *et al.*, 2008)

Determination of feed and weight gain parameters were calculated. Daily mean temperature and relative humidity were also determined. Body weight and linear body measurements data collected in this study were subjected to Analysis of Variance (ANOVA) (Steel and Torrie, 1980) and significantly different means were separated by using the procedure of SAS (2005).The model for the ANOVA was represented as:

Model: Yijk = μ+ai+eijk

Yijk = body weight measurements.

μ. = overall mean

ai = effect of the ith genotype (i = 1,2,3 and 4).

Eijk = random error

III. RESULTS

The body weight, feed intake and cost analysis of indigenous chicks are presented in Table 1. There were significant ($p < 0.05$) differences among the genotypes in all the parameters studied. Mortality was highest (7.05 %) in normal feathered birds, followed by frizzle feathered birds (6.13 %). The final body weight among the indigenous chicks were 158.13 g, 152.50 g and 203.95 g for normal feathered, frizzle feathered and naked neck respectively.

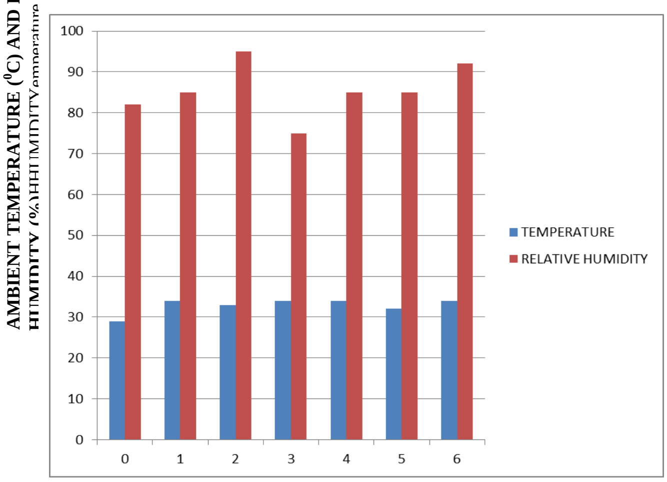
Parameters	Normal Feathered	Frizzle Feathered	Naked Neck
Initial weight	28.09 ± 1.48^b	24.27 ± 1.35^c	30.31 ± 3.74^a

(g/bird)			
Final weight (g/bird)	158.13 ± 29.26^{b}	152.50 ±16.30^{c}	203.95 ± 56.60^{a}
Weight gained (@ 6 weeks)	130.04 ± 2.00^{b}	128.23 ± 3.42^{b}	173.64 ± 2.41^{a}
Daily weight gain (g/bird)	3.10 ± 0.04^{b}	3.05 ± 0.03^{b}	4.13 ± 0.02^{a}
Daily feed intake (g/bird)	143.07 ± 0.12	140.10 ± 0.15	136.08 ± 0.10
Total feed intake	6008.94 ± 4.17	5884.20 ± 4.32	5715.92 ± 5.60
Feed conversion ratio (FCR)	46.21 ± 0.24	45.89 ± 0.27	32.92 ± 0.08
Feed cost per kg (₦)	3.09 ± 0.02	3.02 ± 0.02	2.93 ± 0.03
Total cost of feed consumed (₦)	442.09 ± 1.80	423.10 ± 1.74	398.71 ± 1.86
Feed cost per kg gain (₦)	142.61± 3.15	138.72 ± 3.08	96.54 ± 3.00
Feed efficiency	0.01 ± 0.00	0.92 ± 0.00	1.28 ± 0.00
Mortality (%)	7.05 ± 0.09^{a}	6.13 ± 0.09^{a}	5.50 ± 0.08^{a}

Means in the same row with different superscript differ significantly (P<0.05).
Source: Field work 2019
Table 1: Feed intake, body weight and cost per kg body weight gain of indigenous chickens' genotypes

Mean weekly linear body parameters measured are as presented in Table 2. Comb length values ranged from 0.62 to 2.42 cm with a mean of 1.52 cm for normal feathered, and 0.59 to 1.38 cm with a mean of 0.99 cm for frizzle feathered birds while naked neck ranged from 0.50 to 1.38 cm. Neck length values ranged from 0.67 to 2.40 cm with a mean of 1.54 cm for frizzle feathered and 3.91 to 7.79 cm with a mean of 5.85 cm for naked neck birds respectively. Wing length values ranged from 3.15 to 9.81 cm with a mean of 6.48 cm for normal feathered, followed by frizzle feathered (3.01 to 10.37 cm) with a mean of 6.69 cm and 4.00 to 10.35 cm with a mean of 7.18 cm for naked neck respectively. Keel length values ranged from 1.38 to 2.94 cm with a mean of 2.16 cm for normal feathered, 1.30 to 2.86 cm with a mean of 2.08 cm for frizzle feathered and naked neck had a ranged from 2.00 to 7.24 cm with a mean of 3.12 cm. Breast girth values ranged from 0.70 to 2.68 cm with a mean of 1.69 cm for normal feathered, followed by frizzle feathered which ranged from 0.60 to 2.61 cm with a mean of 1.61 cm and 2.57 to 5.68 cm with a mean of 4.12 cm for Naked neck. The mean thigh length values ranged from 2.34 to 9.81 cm with a mean of 6.07 cm for normal feathered while the values ranged from 2.31 to 8.20 cm with a mean of 5.25 cm for frizzle naked neck.

Results in Table 2 showed that the naked neck birds had better mean values in all the traits measured compared to their counterparts at six (6) weeks of age. The prevailing weather conditions are presented in Figure 1. Ambient temperature ranged from 29 ^{0}C to 34 ^{0}C while relative humidity ranged from 75 to 96 %. The growth performance of the indigenous chicks during the experimental period is shown in Figure 2 and 3.

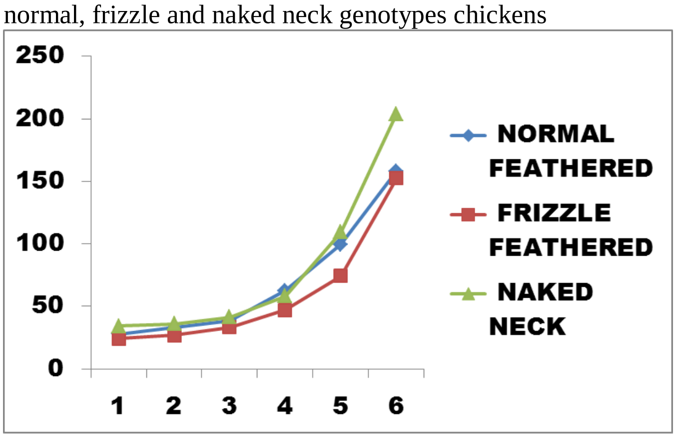


Source: Field work 2021 Weeks of age

Figure 1: Frequency distribution bar – chart of weekly ambient temperature and relative humidity at the Poultry research centre of Delta State University of Science and Technology, Ozoro

The regression equations and coefficient of determination (R^2) of ambient temperature on some growth parameter and mortality in indigenous chickens are presented in Table 3. The R^2 (coefficient of determination) values indicate that the analysis of variance accounted for 0.2, 1, 1.3, 2.2, 3.5 and 1.4 per cent of the variance in comb, neck, wing, keel length, thigh length and mortality respectively.

A significant (P<0.05) negative correlation was obtained between body weight and beak length for grower birds (-0.68 and -0.46) except for starter birds in (normal, frizzle and naked neck) and between body weight and wing length (-0.31) for grower in frizzle feathered birds. Morphometric traits measured in starter birds were significantly (P<0.05) correlated with body weight (0.07-0.81) for normal feathered (0.04-0.92) for frizzle feathered) and (0.05-0.97) for naked neck (Table 4). Correlation estimates between body weight and morphometric traits in grower birds were generally higher (0.39-0.98) than estimates obtained for starter birds (Table 4). Correlation between morphometric traits and body weight in male birds were generally higher (0.95) than in female (0.82) normal, frizzle and naked neck genotypes chickens



Source: Field work 2021
Figure 2: Growth pattern of body weight of indigenous chicks

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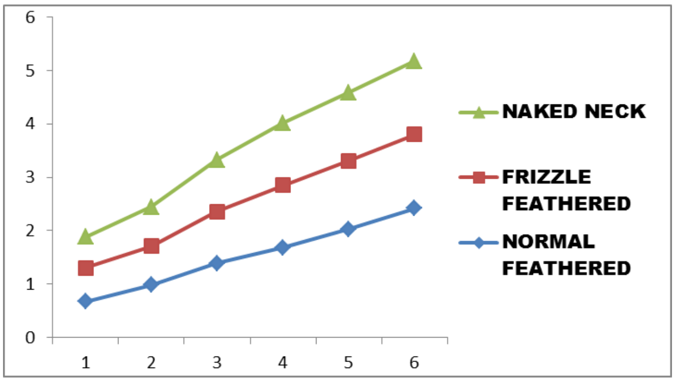

Source: Field work 2021

Figure 3: Growth pattern of comb length of indigenous chicks

Genotype	Variable	Weeks 0	1	2	3	4	5	6
Normal	CL	0.62 ± 0,09^{a}	0.67 ± 0.01^{a}	0.98 ± 0.03^{a}	1.39 ± 0.13^{a}	1.68 ± 0.02^{a}	2.03 ± 0.04^{a}	2.42 ± 0.10^{a}
Frizzle		0.59 ± 0.08^{b}	0.63 ± 0.09^{b}	0.73 ± 0.01^{b}	0.97 ± 0.01^{b}	1.17 ± 0.01^{b}	1.28 ± 0.08^{b}	1.38 ± 0.09^{b}
Naked neck		0.50 ± 0.09^{c}	0.58 ± 001^{c}	0.73 ± 0.09^{c}	0.97 ± 0.08 ^{b}	1.17 ± 0.01^{b}	1.28 ± 0.08^{b}	1.38 ± 0.09^{b}
Normal	NL	0.60 ± 0.02^{c}	0.65 ± 0.05^{c}	0.94 ± 0.05^{c}	1.30 ± 0.02^{c}	1.75 ± 0.07^{b}	2.09 ± 0.02^{b}	2.47 ± 0.09^{b}
Frizzle		0.67 ± 0.06^{b}	0.71 ± 0.01^{b}	1.10 ± 0.09^{b}	1.45 ± 0.06^{b}	1.76 ± 0.06^{b}	2.09 ± 0.01^{b}	2.40 ± 0.05^{b}
Naked neck		3.91 ± 0.08^{a}	3.97 ± 0.05^{a}	4.71 ± 0.06^{a}	6.18 ± 0.03^{a}	7.01 ± 0.06^{a}	7.56 ± 0.05^{a}	7.79 ± 0.08^{a}
Normal	WL	3.15 ± 0.08^{b}	3.19 ± 0.01^{b}	4.32 ± 0.03^{b}	6.14 ± 0.07^{b}	8.22 ± 0.06^{b}	9.24 ± 0.02^{b}	9.81 ± 0.05^{a}
Frizzle		3.10 ± 0.09^{b}	3.15 ± 0.03^{b}	4.28 ± 0.08^{b}	6.19 ± 0.03^{b}	8.29 ± 0.02^{b}	9.35 ± 0.03^{b}	10.37 ± 0.06^{a}
Naked neck		4.00 ± 0.02^{a}	4.04 ± 0.04^{a}	6.25 ± 0.04^{a}	8.27 ± 0.06^{a}	9.37 ± 0.09^{a}	10.23 ± 0.04^{a}	10.35 ± 0.01^{a}
Normal	KL	1.38 ± 0.08^{b}	1.40 ± 0.02^{b}	1.57 ± 0.02^{b}	1.85 ± 0.02^{b}	2.24 ± 0.01^{b}	2.64 ± 0.06^{b}	2.94 ± 0.08^{b}
Frizzle		1.30 ± 0.06^{c}	1.41 ± 0.07^{b}	1.58 ± 0.01^{b}	1.87 ± 0.09^{b}	2.16 ± 0.07^{b}	2.53 ± 0.05^{b}	2.86 ± 0.06^{b}
Naked neck		2.00 ± 0.08^{a}	2.06 ± 0.03^{a}	4.93 ± 0.06^{a}	4.93 ± 0.06^{a}	6.29 ± 0.08^{a}	6.90 ± 0.06^{a}	7.24 ± 0.02^{a}
Normal	BG	0.70 ± 0.07^{b}	1.12 ± 0.01^{b}	1.25 ± 0.01^{b}	1.55 ± 0.01^{b}	1.94 ± 0.01^{b}	2.34 ± 0.03^{b}	2.68 ± 0.08^{b}
Frizzle		0.60 ± 0.02^{c}	0.65 ± 0.07^{c}	1.17 ± 0.05^{b}	1.50 ± 0.03^{b}	1.87 ± 0.05^{b}	2.26 ± 0.06^{b}	2.61 ± 0.07^{b}
Naked neck		2.57 ± 0.06^{a}	2.60 ± 0.03^{a}	3.48 ± 0.01^{a}	4.61 ± 0.01^{a}	5.05 ± 0.04^{a}	5.46 ±0.02^{a}	5.68 ± 0.09^{a}
Normal	THL	2.34 ± 0.01^{b}	2.36 ± 0.01^{b}	2.53 ± 0.08^{b}	4.52 ± 0.09^{b}	4.82 ± 0.05^{b}	7.42 ± 0.03^{b}	8.60 ± 0.02^{a}
Frizzle		2.31 ± 0.04^{b}	2.40 ± 0.03^{b}	2.57 ± 0.02^{b}	4.34 ± 0.06^{c}	6.24 ± 0.03^{a}	9.52 ± 0.02^{a}	9.81 ± 0.08^{a}
Naked neck		3.30 ± 0.08^{a}	3.39 ± 0.01^{a}	4.05 ± 0.03^{a}	4.78 ± 0.06^{a}	5.78 ± 0.06^{a}	10.23 ± 0.04^{a}	10.35 ± 0.09^{a}
Normal	SL	2.20 ± 0.01^{b}	2.25 ± 0.01^{b}	2.42 ± 0.05^{b}	2.73 ± 0.08^{b}	3.03 ± 0.05^{b}	3.46 ± 0.03^{b}	3.80 ± 0.09^{b}
Frizzle		2.20 ± 0.08^{b}	2.28 ± 0.01^{b}	2.49 ± 0.03^{b}	2.78 ± 0.07^{b}	3.10 ± 0.02^{b}	3.48 ± 0.02^{b}	3.86 ± 0.03^{b}
Naked neck		2.58 ± 0.03^{a}	2.62 ± 0.04^{a}	3.13 ± 0.02^{a}	3.76 ± 0.05^{a}	4.15 ± 0.05^{a}	4.60 ± 0.09^{a}	4.90 ± 0.05^{a}
Normal	TL	1.30 ± 0.03^{b}	1.37 ± 0.03^{b}	1.64 ± 0.06^{c}	1.98 ± 0.01^{c}	2.40 ± 0.08^{a}	2.79 ± 0.08^{b}	3.09 ± 0.03^{b}
Frizzle		1.30 ± 0.05^{b}	1.36 ± 0.02^{b}	1.72 ± 0.07^{b}	2.05 ± 0.09^{b}	2.35 ± 0.02^{a}	2.72 ± 0.09^{b}	3.05 ± 0.05^{b}
Naked neck		1.70 ± 0.08^{a}	1.79 ± 0.01^{a}	2.57 ± 0.01^{a}	2.60 ± 0.06^{a}	2.90 ± 0.07^{a}	3.14 ± 0.03^{a}	4.90 ± 0.03^{a}

Means in the same column with different superscript differ significantly (P<0.05)

Source: Field work 2021

Table 2: Weekly mean linear body measurements of indigenous chicks

Variables	Parameter estimate B	SE	Regression equation	R^2 (%)
Comb length (cm)	-.06 5.11	.18 4.25	Y= 5.11- (.06) x	.23
Neck length (cm)	.14 .36	.19 3.42	Y= .36 + (.14) x	1.05
Wing length (cm)	1.14 – 0.4 .05	1.63 - .04 .01	Y= .05 + (1.14 – 0.4) x	1.30
Keel length (cm)	-.02 .50	.02 .43	Y= .50 – (.02) x	2.20
Thigh length (cm)	-.08 34.62	.08 2.26	Y= 34.62 – (.08) x	3.51
Mortality (%)	-3.54 140.01	3.00 86.70	Y= 140.01 – (3.54) x	1.42

Values on top are the regression coefficient while those values below are for the constant

Source: Field work 2021

Table 3: Regression coefficients of ambient temperature on some growth parameters and mortality in indigenous chickens

	STARTER			GROWER			SEX	
Trait	**NF**	**FF**	**Nn**	**NF**	**FF**	**Nn**	**M**	**F**
CL	0.79*	0.92*	0.97*	0.86*	0.88*	0.98*	0.95*	0.82*
BKL	0.58*	0.51*	0.71*	-0.68*	-0.05	-0.46*	-0.78*	0.61*
HL	0.67*	0.86*	0.69*	0.68*	0.28*	0.72*	0.76*	0.65*
NL	0.64*	0.67*	0.72*	0.72*	0.76*	0.95*	0.89*	0.77*
WL	0.07	0.04*	0.05*	0.32*	0.31*	0.55*	0.93*	0.86*
SL	0.70*	0.65*	0.76*	0.45*	0.71*	-0.26	0.52*	0.22*
TL	0.74*	0.72*	0.79*	-0.06	0.35*	0.63*	0.91*	0.83*
TOL	0.66*	0.69*	0.74*	0.69*	0.72*	0.81*	0.51*	0.24*
BRL	0.76*	0.03	0.79*	0.69*	0.58*	0.84*	0.74*	0.49*
BRW	0.81*	0.75*	0.85*	0.40*	0.37*	0.39*	-0.01	0.18

**Significant ** Highly Significant ((P<0.05)*

Table 4: Effect of temperature and relative humidity on the body weight and morphometric measurements

IV. DISCUSSION

The weight gain obtained in this study revealed that the daily weight gain (DWG) of indigenous chicks values of 3.10 g and 4.13 g for normal feathered and naked neck are in conformity with those of Adeleke *et al*., (2011) who reported DWG of 4.17 g per bird for starter pullets, which is higher than 3.10 g per bird per day for egg-laying chickens reported by Oluyemi and Roberts (2003).. Average daily feed intake of indigenous chicken in the present study (136.08 g to 143.07 g) per bird per day were lower than those observed by Adebambo *et al*. (2008) for starter pullets (239.61 to 241.58 g) per bird per day and 285.03 g per day per bird for six (6) weeks by Chatterjee *et al.* 2007a; Peters *et al.*, 2008a. This difference could possibly be due to high temperature and relative humidity and region. The results of feed conversion ratio (FCR) revealed that naked neck birds utilized their diets more efficiently than normal feathered and frizzle chickens. Adebambo *et al*. (2008) also reported similar observation on feed efficiency indicating that indigenous birds on the same diet consumed more feed than the exotic birds hence a higher feed cost per kg gain. This finding is consistent with the report of Chatterjee *et al.* (2007a) that indigenous chicken consumed more than the exotic. Normal feathered and frizzle feathered birds were the poorest in terms of economy of the production by gaining 130.04 g and 128.23 g of body weight consuming 6008.94 g and 5884.20 g of feed to attain 158.13 g and 152.50 g of live body weight at 6 weeks of age. The naked neck birds were the best consuming 5715.36 g of feed to attain live body weight values of 203.95 g.The higher feed intake by normal feathered could not be converted to body weight and can therefore not fit into high degree of specialization which

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permit optimum feed intake and utilization for productive purpose. The weight gain of naked neck was higher than normal feathered and frizzle feathered. Naked neck had the highest weight gain of 173.64 g per bird. This finding agreed with the report of Udeh (2010). The daily weight gains in this study are in line with values in literature (Ndofor, 2003; Oluyemi and Roberts, 2003; Udeh, 2010). Feed cost per unit weight gain with naked neck birds were lower compared to normal feathered and frizzle feathered. However, the results showed that indigenous chickens kept under intensive management system are subjected to high relative humidity above 70 %. This provides environmental conditions suitable for microbial growth in the litter. Ammonia concentrations as low as 25 ppm for the first 25 days can have a negative effect on body weight at both 4 and 7 weeks of age (Mile *et al.*, 2004). Habit of panting was frequently observed among the indigenous chicks because the level of relative humidity influences the ability of the bird to cool itself and influences ammonia production.

However, the heavier body weight recorded for the naked neck chicks could be attributed to its superiority in terms of keel length and breast girth which suggest its potential for meatiness (Fayeye*et al.*, 2006). Also the Naked neck chicks may have had more muscles and meat in the thigh region although they were not as long as those of the frizzle and normal chicks during the period of this study. Again, from the results presented in Table 1, it is clear that the superiority of the naked neck chicks over normal and frizzle chicks were both on body weight and other body parameters which account for meatiness. This reveals that keel length and breast girth are more associated with development of meat and muscles since keel length and breast girth are indicators of meatiness in poultry species (Adebambo *et al* 1996; Ikeobi and Godwin 1999; Fayeye *et al*, 2006). The early growth of the comb of naked neck could be a sign of earlier sexual maturity when compared to the normal and frizzle chicks with longer thigh as they mature whereas the naked neck chick grew slower at the thigh and increased in Keel length and Breast girth consistently throughout the period under study. The development determines to a great level the body weight of the animal. Though the normal and frizzle chicks had longer thigh (Drum sticks), it did not contribute to higher live weight gains. This is probably due to the fact that the chicks did not build flesh around the thigh.

Ambient temperature and relative humidity on indigenous chicks were above their comfort zone from day – old to 42 days of age. The findings revealed that as ambient temperature and relative humidity increased, it affects feed intake level and this result to slow growth and development of the birds. Despite this, naked neck birds were able to tolerate high body temperature and relative humidity to maintain their comfort zone throughout the period of the study. The results revealed that naked neck birds ultimately utilized and gained energy from the feed consumed, and this enhanced rapid growth and development of the naked neck birds over their counterparts. (Czarick *et al* (2001) and Fairchild *et al.*, (2004) both reported that when birds are kept in environmental temperature above or below their comfort zone, more energy must be expended to maintain body temperature. It was observed that the month of November supposed to be harmattan period but it rained throughout the period of study. This increased the relative humidity that affected the performance of the birds in terms of climate changes.

The differences in body weight and body linear measurements between naked neck birds and their counterparts may be attributed to environmental factors. Normal and frizzle feathered birds exhibited low live weight and body linear measurements due to high environmental temperature and relative humidity. The chicks expended more energy to maintain body temperature, this extra energy will be ultimately be supplied by the feed consumed. The energy supplied by the feed will be used to maintain body temperature instead of growth and development. R^2 values indicate that the analysis of variance accounted for 0.2, 1, 1.3, 2.2, 3.5 and 1.4 per cent of the variance in comb, neck, wing, keel length, thigh length and mortality respectively. These figures thus suggest that ambient temperature that is more than 30^0C influence growth parameters and mortality, thus corroborating the report of other workers who observed impairment in growth at ambient temperature of 30^oC and above.

Body length and comb length had higher correlation when compared to the other morphometric measurements in the three genotypes for grower birds. The differences between normal, frizzle and naked neck for starter and grower genotypes chicken in morphometric trait measurements were not similar to the results of morphometric measurements in birds of different genotypes (Islam and Dutta, 2010; Ogah, 2013).

V. CONCLUSION

The indigenous chicken genotypes used for this study showed potentials for growth and development if the effects of climate changes can be handled properly. The impact of high ambient temperature and high relative humidity in indigenous chicken buildings in ambient conditions encountered during dry season is very critical. According to results it was noted that lack of environmental condition control with high stocking density added to high ambient temperature and very high relative humidity. These conditions denote a situation of chronic heat stress which has strong impact on growth and physiology of birds' performance which gives by consequences, low scale weight and high mortality rate. The effect of high ambient temperature and low humidity has an impact at the level of digestive morphometry (Areila *et al.*, 2018).

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REFERENCES

[1] Abeke, F.O. 2009. Improved techniques of home stead egg hatching and artificial brooding of local chickens. Proceedings of 34th Annual Conference NSAP Uyo, Nigeria March 15th – 18th, 2009 Pp. 315 – 317.

[2] Adebambo, O.A., Ikeobi, C.O.N., Ozoje, M.O, Adenowo, J.A and Osinowo, O.A 1996.Variation in qualitative traits and their effects on the performance of local ducks and Turkeys. Nigerian Journal of Genetics 11::20 -23.

[3] Adebambo, O.A, Ikeobi, C.O.N., Ozoje, M. Oduguwa,O.O.,Adebambo,Olufunmilato O.A. 2008.Genetic variations in feed efficiency among pure and crossbred meat type chickens. Nigerian Poultry Science Journal 5(2):61-69.

[4] Adeleke,M.A.,Peters,S.O.,Ozoje,M.O.,Ikeobi,C.O.N.Bamgbose, A.M. and Olufunmilayo, A. Adebambo 2011. Genetic parameter estimates for body weight and linear body measurements in pure and crossbred progenies fo Nigerian indigenous chickens. Livestock Reasearch for Rural Development 23(1): 1-8

[5] Akanji, A.M., Ologhobo, A.D. Emola, I.A; Adedeji T.A; and Adedeji O.S., 2003. The effects of processing on haemagglutinm and other anti-nutritional factors in jackbeans (can awaliaensiforms) (L) (DC) Proc. 2877L Ann. Conf. NSAP, Ibadan, Nigeria Pp. 189-193.

[6] Areila, J.C.K. Tinoco, D.F.F, Saraz, J.A.O, Rocha, K.S.O. Candide, N.G.L (2018). Z00technical and physiological performance of broilers in the final stage of growth subjected to different level of heat stress. Magazine National Faculty of Agronomy Medallin 71 (2): 8469-8476

[7] Chatterjee, R.N.Rai,R.B., Kundu,A., Senani,S.,Sunder,J. 2007a Egg quality traits of indigenous breeds of chicken of Andaman. Indian Veterinary Journal.84:206 -208

[8] Czarik, M., and M.P. Lacy, 2001. Heating System Thermostat/Sensor location, November. University of Goergia Comparative Extension Service.

[9] Delta State University of Science and Technology Meteorological Station Report, Ozoro, 2021

[10] F.A.O. (Food and Agricultural Organization) 2004. Small Scale poultry production Technology Guide F.A. Animal Production and Health Manual, Rome, F.A.O. 119 pp.

[11] Fayeye, T.R; Ayorinde, K.L; Ojo, V. and Adesina, M.O. 2006. Frequeny and influence of some major genes and body weight and body size parameters of Nigeria Local Chickens. Livestock Research for Rural Development 18 (3) 2006.

[12] Fairchild, B.D., 2004. Poultry Housing Tips University of Georgia Cooperative Extension Service of Environment Factors to control when brooding chicks B. 1287.

[13] Ikeobi, CON; Ozoje, M.O; Adebambo, O.A. and Adenowo, J.A. 1998. Modifier genes and their effects in the Nigeria Local Chickens: Philopody and comb type. Proc. Of 6th World Cong. Genet Appl. Livest. Prod., 24:318-321.

[14] Islam M.S. and Dutta R.K. (2010). Morphometric analysis of indigenous, exotic and crossbred chickens (Gallus domesticus) in Rajshahi. Bangladesh J. Biosciences. 18, 94-98.

[15] Molenaar,R.,Reijrink,I.A.M.,Meijerhof,R and Van Den Brand,H.2008 Relationship between hatching length and weight on later productive performance in broilers. World's Poultry Science Journal. 64(4):599-603.

[16] Mile, and Fairchild B.D. 2004. Relation humidity and Ammonia level in poultry house during chicks. Brooding B.1287.

[17] Ndofor, H.M 2003. Estimation of genetics parameters of growth traits of local ecotypes reared in the derived Savannah area of Nsukka .M.Sc. Dissertation University of Nigeria. Nsukka

[18] Ogah D.M. (2013). Canonical discriminant analysis of morphometric traits in Indigenous chicken genotypes. Trakia J. Sci. 2, 170-174. SPS

[19] Oluyemi, S.O., Roberts, F.A. 2003 Poultry production in warm wet climates 2nd edition spectrum Books limited Ibadan, Nigeria. Pp 105-110.

[20] Peters,S.O., Ilori,B.M., Ozoje,M.O., Ikeobi, C.O.N and Adebambo,A.O.2008a.Gene segregation effects on fertility and hatchability of pure and crossbred chicken genotypes in the humid tropics. International .Journal of Poultry Science (10):954-958

[21] SAS, 2005. SAS Users Guide: Statistics released version 8.0 Statistics Analysis System Institute, Inc, Cary, NC, USA

[22] Udeh,I 2010. Mode of inheritance and interrelationship among Age at First Egg, Body Weight at First Egg and Weight of First Egg in Local by Exotic inbred Chicken Crosses. International Journal of Poultry Science 9 (10):948- 953.