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**Original Research Article**

# Effect of Batch of Hatch on Growth Performance of Nigerian Indegenous Tiv Chicken Ecotype

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**Abstract:** Study on the effect of batch of hatch on growth performance of the Nigerian Tiv chicken ecotype was undertaken to investigate genetic diversity within the populations. A total of 55 birds comprising of 50 hens and 5 cock were purchased and used as the base population. A mating ratio of 1 cock to 10 hens was applied to generate the experimental birds. After successful four batches of hatching, 354 chicks were generated. The birds were raised according to their batch of hatch until mortality. Data were collected on body weight, body weight gain, growth rate and mortality rate. Data collected were subjected to one-way Analysis of Variance using the SPSS statistical package version 21. The results indicate that batch of hatch had significant (P<0.05) effect on weekly body weight, body weight gain and growth rate at day old and at subsequent weeks until maturity. Batches 3 and 4 had significantly (P<0.05) higher body weight, body weight gain and growth rate compared to batches 1 and 2. Batches 2 and 4 had significantly (P<0.05) lower mortality rate compared to batches 1 and 3 at initial age but as from 7 weeks of age, batches 1 and 2 had significantly (P<0.05) lower mortality rate compared to batches 3 and 4. From this study, it was recommended that the genetic diversity across batch of hatch within the Tiv chickens observed in this study should be exploited through selection subsequent crossing between birds from different batch of hatch to take advantage of heterosis.

**Keywords:** Body weight, body weight gain, growth rate and mortality rate.



## INTRODUCTION

Genetic diversities in the indigenous livestock species in developing countries are valuable attributes or assets for production, adaptation and resistance of the indigenous animals to endemic diseases. Genetic diversity is the product of interaction between environment and genetic effects. This interaction which leads to differentiation of morphological, physiological and productive traits vital to all production systems provide selection criterion for breed improvement needed for adaptation to changing environmental circumstances (Ceriotti *et al.*, 2003). Quantifying the structure of genetic diversity in different African chicken populations is of significance in optimizing genetic improvement, conservation and utilization strategies. The unique values of their genes for egg and meat production, disease resistance, hardiness and adaptation to local environment would in future be needed to broaden the genetic resource base for breeding of improved commercial birds. Nigerian local chickens have been described based on phenotypic traits (Nwosu *et al.*, 1985; Adebambo *et al.*, 1999). Such information if complemented with findings obtained using batch of hatch could be useful in formulating long term plans of breeding for genetic improvement programs. The objective of the study was to determine the effect of batch of hatch on growth performance of the Tiv chicken ecotype of Nigeria.

## MATERIALS AND METHODS

### Location of the Study

The experiment was carried out from June 2017 to October 2018 at the Livestock Teaching and Research Farm of the Faculty of Agriculture, Shabu-Lafia Campus, Nasarawa State University, Keffi, Nasarawa State. Nasarawa State falls within the Southern Guinea Savannah Zone of Nigeria. Lafia lies between latitude 7º and 9º North and Longitude 7º and

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10º East. It has a climate typical of the tropical zone because of its location. It has a temperature ranging from 20 ºc in October to 36 ºc in March while rainfall varies from 13.73 cm in some places to 14.00 cm in others. The area is characterized by farmers with backyard animal (chicken) rearing (NiMET, 2008).

**Experimental Procedure**

A total of 55 birds comprising of 50 hens and 5 cock were purchased and used as the base population. After purchase, the birds were kept for four weeks for acclimatization. During this period, the birds were dusted against ectoparasites, dewormed and vaccinated against Newcastle disease using Lasota ®. Antistress (vitalyte), antibiotics and coccidiostat were administered through water to check against possible disease outbreak. After quarantine and acclimatization, were randomly assign to pens in the rearing house. A mating ratio of 1 cock to 10 hens was used. The cock in each breeding pen was allowed to freely mate their respective hens. Fertile eggs for hatching were collected when the birds had laid for four weeks. This was aimed at obtaining higher fertility and hatchability. The birds were fed standard feed as recommended by Dafwang (2006). Feed and water were provided *ad-libitum.*

Hatching eggs were collected twice a day and accumulated for 5 days during which they were held in egg crates under room temperature with good ventilation. At the end of 5 days of egg collection, the eggs were transported to Phenab Agro Venture, beside fire service, Bukuru express way, Angul-D Jos Plateau State for hatching. The eggs were set for pedigree hatching in an automatic electric incubator at weekly interval for four consecutive weeks (four batches). After successful four batches of hatching, 354 chicks were generated. The hatch chicks were raised according to their batch of hatch. The birds were managed using standard procedure until maturity and data collected.

**Parameters Measured**

**Body Weight:** Live body weights were measured at hatch using sensitive electronic scale and then at weekly interval until 12 weeks of age. Thereafter, body weights were taken at week 16 and week 20.

**Body weight gain**: Average daily gain (ADG) was estimated using the formula:

$$\text{Body weight gain} = \frac{W2-W1}{N}$$

Where $W_2$ is the present weight, $W_1$ is the initial weight and N is the number of days taken from initial weight to the present weight.

**Growth rate:** Absolute growth rate was determined from the weekly body weight changes using the formula:

$$\text{Growth Rate} = \frac{W2-W1}{W2}\times 100$$

Where $W_1$ = weight at the beginning of the period and $W_2$ = weight at the end of the period.

**Mortality rate:** The percentage mortality was estimated from hatch till point of lay on weekly basis. This was estimated using the formula:

$$\text{Mortality rate} = \frac{No.of\ dead\ chicken\ over\ the\ week}{No.of\ chicken\ at\ the\ begining\ of\ the\ week} \times \frac{100}{1}$$

**Experimental Design Data Analysis**

Stratified random sampling technique was employed in assembling the base population. Completely Randomized Design (CRD) was used in which the the chicks were made into four groups according to their batch of hatch which served as the treatments. Data collected were analyzed using one-way Analysis of Variance (ANOVA) using the SPSS statistical software (2011). The following statistical model was entertained:

$$Y_{ij} = \mu + E_i + e_{ij}$$

$Y_{ijk}$ = The $j^{th}$ observation on the $i^{th}$ batch of hatch
$\mu$ = Overall mean
$E_i$ = Fixed effect of the $i^{th}$ batch of hatch (j = 1, 2, 3 and 4)
$e_{ij}$ = Random residual error ~ (0, 1)

## RESULTS

Batch of hatch (Table 1) had significant ($P<0.05$) effect on body weight at hatch and at subsequent weeks until week 20. Batch 1 had significantly ($P<0.05$) higher body weights at day old, weeks 1 and 2 with values of 24.12±0.38 g, 37.66±0.61 g and 46.33±0.92 g, respectively. At week 3, batches 1, 3 and 4 significantly ($P<0.05$) differed from batch 2 while at weeks 4 and 12, batch 4 had significantly ($P<0.05$) higher body weight (76.17±1.67 g) compared to other batches. Birds in batches 3 and 4 had significantly ($P<0.05$) higher body weight than those in batches 1 and 2 at weeks 5, 6, 7, 8, 9, 10, 11 and 16. However, at week 20, birds in batches 2 and 3 had significantly ($P<0.05$) higher body weight (899.38±20.92 g and 913.80±26.10 g) compared to batches 1 and 4.

**Table 1: Effect of Batch of Hatch on Hatch Weight and Weekly Body Weight (g) of Nigerian Indegenous Tiv Chicken Ecotype**

| Body Weight | Batch 1 | Batch 2 | Batch 3 | Batch 4 | LOS |
|---|---|---|---|---|---|
| HWT | 24.12±0.38$^{a}$ | 22.68±0.37$^{b}$ | 22.34±0.33$^{b}$ | 22.76±0.35$^{b}$ | * |
| Week 1 | 37.66±0.61$^{a}$ | 33.42±0.64$^{b}$ | 34.41±0.52$^{b}$ | 30.74±0.48$^{c}$ | * |
| Week 2 | 46.33±0.92$^{a}$ | 39.40±0.77$^{b}$ | 41.23±0.60$^{b}$ | 40.89±0.64$^{b}$ | * |
| Week 3 | 53.27±1.21$^{a}$ | 45.58±0.91$^{b}$ | 52.61±0.90$^{a}$ | 50.58±0.95$^{a}$ | * |
| Week 4 | 61.51±1.61$^{c}$ | 64.17±1.40$^{bc}$ | 66.16±1.26$^{b}$ | 76.17±1.67$^{a}$ | * |
| Week 5 | 84.44±2.39$^{b}$ | 75.32±1.80$^{c}$ | 104.16±2.54$^{a}$ | 99.36±2.15$^{a}$ | * |
| Week 6 | 98.71±2.93$^{b}$ | 93.35±2.33$^{b}$ | 128.46±2.61$^{a}$ | 122.42±2.79$^{a}$ | * |
| Week 7 | 115.16±3.47$^{c}$ | 114.70±3.42$^{c}$ | 154.73±3.26$^{a}$ | 139.67±3.40$^{b}$ | * |
| Week 8 | 145.86±4.44$^{b}$ | 144.29±3.96$^{b}$ | 176.06±4.00$^{a}$ | 183.17±4.51$^{a}$ | * |
| Week 9 | 184.86±5.34$^{b}$ | 180.74±4.81$^{b}$ | 234.58±4.51$^{a}$ | 220.78±5.27$^{a}$ | * |
| Week 10 | 218.40±6.47$^{c}$ | 193.12±5.99$^{d}$ | 266.14±5.51$^{a}$ | 245.30±6.09$^{b}$ | * |
| Week 11 | 233.14±7.30$^{c}$ | 258.87±7.16$^{b}$ | 294.63±6.95$^{a}$ | 287.91±7.52$^{a}$ | * |
| Week 12 | 321.94±8.99$^{b}$ | 318.28±8.92$^{b}$ | 333.77±9.00$^{b}$ | 379.51±9.49$^{a}$ | * |
| Week 16 | 545.19±16.52$^{a}$ | 490.35±15.59$^{b}$ | 564.96±19.82$^{a}$ | 568.12±20.30$^{a}$ | * |
| Week 20 | 863.37±22.17$^{ab}$ | 899.38±20.92$^{a}$ | 913.80±26.10$^{a}$ | 818.24±31.65$^{b}$ | * |

HWT = hatch weight, G = gram, LOS = level of significant, $^{abcd}$ = value with the same superscript on the same row are not significanty (P>0.05) different, NS = non significant, * = significant at 5 percent probability.

The effect of batch of hatch on average daily body weight gain (ADBWG) in the Nigerian Tiv ecotype is present in Table 2. Batch of hatch had significant (P<0.05) effect on ADBWG at all ages except at weeks 4-5, 9-10 and 12-16 which were not significant. Batch 4 had significantly higher ADBWG at weeks 1-2, 2-3, 3-4, 5-6, 7-8 and 11-12 compared to other batches. Batch 1 had significantly (P<0.05) higher ADBWG at weeks 0-1 and 11-12. Batch 2 was significantly higher in ADBWG at week 10-11 comparerd to other batches. At maturity, batches 2 and 3 had significantly (P<0.05) higher ADBWG compared to batches 1 and 4 with values of 14.51±0.76 and 12.54±0.17, respectively.

**Table 2: Effects of Batch of Hatch on Average Daily Body Weight Gain (g) of Nigerian Indegenous Tiv Chicken Ecotype**

| Week | Batch 1 (Mean±sem) | Batch 2 (Mean±sem) | Batch 3 (Mean±sem) | Batch 4 (Mean±sem) | LOS |
|---|---|---|---|---|---|
| Week 0 – 1 | 1.95±0.13$^{a}$ | 1.54±0.03$^{b}$ | 1.72±0.08$^{ab}$ | 1.16±0.06$^{c}$ | * |
| Week 1 – 2 | 1.23±0.14$^{ab}$ | 0.86±0.10$^{ab}$ | 1.01±0.11$^{ab}$ | 1.42±0.15$^{a}$ | * |
| Week 2 – 3 | 0.99±0.10$^{b}$ | 0.89±0.10$^{b}$ | 1.63±0.08$^{a}$ | 1.42±0.13$^{a}$ | * |
| Week 3 – 4 | 1.16±0.08$^{d}$ | 2.67±0.15$^{b}$ | 1.93±0.21$^{c}$ | 3.68±0.19$^{a}$ | * |
| Week 4 – 5 | 3.26±0.21 | 3.58±2.06 | 5.39±0.59 | 3.38±0.23 | NS |
| Week 5 – 6 | 2.02±0.33$^{b}$ | 2.57±0.32$^{ab}$ | 3.48±0.46$^{a}$ | 3.41±0.44$^{a}$ | * |
| Week 6 – 7 | 2.33±0.46$^{b}$ | 3.13±0.40$^{ab}$ | 3.75±0.49$^{a}$ | 2.44±0.36$^{ab}$ | * |
| Week 7 – 8 | 4.36±0.39$^{b}$ | 4.21±0.54$^{b}$ | 2.97±0.60$^{b}$ | 6.65±0.69$^{a}$ | * |
| Week 8 – 9 | 5.60±0.34$^{ab}$ | 5.13±0.61$^{b}$ | 8.38±1.34$^{a}$ | 6.42±1.01$^{ab}$ | * |
| Week 9 – 10 | 4.70±1.24 | 2.97±0.97 | 4.60±0.43 | 3.43±0.29 | NS |
| Week 10 – 11 | 3.75±0.40$^{b}$ | 9.75±1.13$^{a}$ | 4.01±0.71$^{b}$ | 6.11±1.36$^{b}$ | * |
| Week 11 – 12 | 12.63±0.98$^{a}$ | 8.36±0.96$^{b}$ | 5.68±1.79$^{b}$ | 12.83±1.17$^{a}$ | * |
| Week 12 – 16 | 7.88±0.66 | 6.15±0.56 | 8.19±0.48 | 6.49±1.13 | NS |
| Week 16 – 20 | 10.75±1.00$^{b}$ | 14.51±0.76$^{a}$ | 12.54±0.17$^{ab}$ | 9.27±1.92$^{b}$ | * |

LOS = level of significant, $^{abc}$ = value with the same superscripts on the same row are not significantly (P>0.05) different, * = significant at 5 percent probability, NS = non significant, SEM standard error of the mean.

Table 3 presents the effect of batch of hatch on the growth rate (GR) of the Tiv chicken ecotype. Batch of hatch had significant (P<0.05) effect on growth rate except at weeks 5-6, 6-7, 8-9 and 9-10. Batches 1, 2 and 3 were not significantly (P>0.05) different from each other but they differed significantly (P<0.05) from batch 4 at week 0-1. The mean values of the effect of batch of hatch on GR was significantly (P<0.05) higher in batch 4 compared to batches 1, 2 and 3 at weeks 1-2, 2-3 and 3-4. At week 4-5, batch 3 significantly (P<0.05) differed from batches 1, 2 and 4. Batches 1, 2 and 4 had significantly (P>0.05) higher GR at week 7-8. Batch 2 had the highest growth rate at weeks 10-11 and 16-20 while batch 1 had significantly (P<0.05) higher body weight than batches 2, 3 and 4 at week 11-12. At week 12-16, batches 1 and 3 significantly (P<0.05) differed compared to batches 2 and 4.

**Table 3: Mean values of the effects of Batch of Hatch on Growth Rate (GR) of Nigerian Indegenous Tiv Chicken Ecotype**

| Growth rate | Batch 1 (Mean±sem) | Batch 2 (Mean±sem) | Batch 3 (Mean±sem) | Batch 4 (Mean±sem) | LOS |
|---|---|---|---|---|---|
| Week 0 – 1 | 36.08±1.92$^{a}$ | 32.14±0.45$^{a}$ | 35.01±1.39$^{a}$ | 26.34±1.25$^{b}$ | * |
| Week 1 – 2 | 18.41±1.50$^{b}$ | 15.10±1.37$^{b}$ | 16.48±1.44$^{b}$ | 24.34±2.03$^{a}$ | * |
| Week 2 – 3 | 12.93±1.27$^{b}$ | 13.61±1.55$^{b}$ | 21.05±1.45$^{a}$ | 19.49±1.43$^{a}$ | * |
| Week 3 – 4 | 13.22±0.49$^{d}$ | 28.96±0.84$^{b}$ | 20.28±1.72$^{c}$ | 33.72±0.58$^{a}$ | * |
| Week 4 – 5 | 27.05±0.92$^{b}$ | 14.50±2.13$^{c}$ | 35.96±2.08$^{a}$ | 23.59±0.79$^{b}$ | * |
| Week 5 – 6 | 14.19±2.05 | 19.02±2.09 | 19.10±2.54 | 19.05±1.92 | NS |
| Week 6 – 7 | 13.82±2.05 | 18.85±2.19 | 16.90±1.96 | 12.33±2.01 | NS |
| Week 7 – 8 | 21.09±1.70$^{a}$ | 20.13±1.82$^{a}$ | 11.57±1.93$^{b}$ | 24.62±1.61$^{a}$ | * |
| Week 8 – 9 | 21.40±1.54 | 19.90±2.29 | 24.64±3.59 | 19.69±2.61 | NS |
| Week 9 – 10 | 14.63±3.44 | 9.80±2.79 | 12.14±1.03 | 9.78±1.01 | NS |
| Week 10 – 11 | 11.04±1.17$^{b}$ | 26.20±3.08$^{a}$ | 9.58±1.63$^{b}$ | 14.52±2.95$^{b}$ | * |
| Week 11 – 12 | 27.68±2.38$^{a}$ | 18.23±1.78$^{bc}$ | 11.65±3.52$^{c}$ | 23.61±1.94$^{ab}$ | * |
| Week 12 – 16 | 40.32±1.93$^{a}$ | 34.86±2.74$^{ab}$ | 40.73±2.19$^{a}$ | 31.50±3.80$^{b}$ | * |
| Week 16 – 20 | 35.43±1.59$^{ab}$ | 45.10±1.27$^{a}$ | 38.42±0.57$^{ab}$ | 30.87±5.80$^{ab}$ | * |

LOS = level of significant, $^{abc}$ = value with the same superscripts in the same row are not significantly (P>0.05) different, NS = not significant, * = significant at 5 percent probability, SEM standard error of the mean.

The effect of batch of hatch on mortality rate (MR) is presented in Table 4. Batch of hatch had significant (P<0.05) effect on MR at weeks 4-5, 7-8, 8-9, 12-13, 14-15, 15-16, 16-17, 17-18 and 19-20. Batches 2 and 4 had significantly (P<0.05) lower mortality rate compared to batch 1 and 3 at weeks 4-5 and 15-16. At weeks 7-8 and 17-18, batches 1, 2 and 3 had similar mortality rate. Batches 1 and 2 had significantly (P<0.05) lower mortality rate compared to batches 3 and 4 at weeks 8-9, 12-13 and 14-15 in the Tiv ecotype. At week 16-17, batches 1, 3 and 4 had significantly (P<0.05) lower mortality rate than batche 2 while at week 19-20, batches 2, 3 and 4 were similar and had significantly (P<0.05) lower mortality rate compared to batch 1.

**Table 4: Effects of Batch of Hatch on Mortality Rate (%) of Nigerian Indegenous Tiv Chicken Ecotype**

| Week | Batch 1 (Mean±sem) | Batch 2 (Mean±sem) | Batch 3 (Mean±sem) | Batch 4 (Mean±sem) | LOS |
|---|---|---|---|---|---|
| Week 0 – 1 | 2.00±1.23 | 3.64±1.50 | 4.11±1.06 | 5.40±1.67 | NS |
| Week 1 – 2 | 1.00±1.00 | 0.00±0.00 | 1.00±1.00 | 1.25±1.25 | NS |
| Week 2 – 3 | 1.33±1.33 | 1.43±1.43 | 5.38±1.69 | 2.83±1.97 | NS |
| Week 3 – 4 | 2.23±1.37 | 1.11±1.11 | 0.00±0.00 | 0.00±0.00 | NS |
| Week 4 – 5 | 2.22±1.36$^{ab}$ | 0.00±0.00$^{a}$ | 4.41±1.90$^{b}$ | 0.00±0.00$^{a}$ | * |
| Week 5 – 6 | 1.11±1.11 | 6.86±2.47 | 0.00±0.00 | 6.43±3.27 | NS |
| Week 6 – 7 | 1.18±1.18 | 2.67±2.67 | 1.05±1.05 | 4.91±2.47 | NS |
| Week 7 – 8 | 0.00±0.00$^{a}$ | 0.00±0.00$^{a}$ | 4.86±3.64$^{a}$ | 23.76±2.89$^{b}$ | * |
| Week 8 – 9 | 0.00±0.00$^{a}$ | 0.00±0.00$^{a}$ | 2.35±2.35$^{ab}$ | 6.57±2.70$^{b}$ | NS |
| Week 9 – 10 | 0.00±0.00 | 2.79±1.72 | 2.76±1.69 | 3.15±1.97 | NS |
| Week 10 – 11 | 2.50±2.50 | 6.12±3.07 | 2.60±1.61 | 7.87±4.09 | NS |
| Week 11 – 12 | 0.00±0.00 | 2.67±2.67 | 4.33±1.79 | 7.47±4.78 | NS |
| Week 12 – 13 | 0.00±0.00$^{a}$ | 0.00±0.00$^{a}$ | 8.71±2.91$^{b}$ | 2.50±2.50$^{ab}$ | * |
| Week 13 – 14 | 0.00±0.00 | 1.54±1.54 | 6.33±2.96 | 3.33±3.33 | NS |
| Week 14 – 15 | 0.00±0.00$^{a}$ | 0.00±0.00$^{a}$ | 12.26±2.66$^{b}$ | 7.08±2.97$^{b}$ | * |
| Week 15 – 16 | 3.78±2.43$^{ab}$ | 1.33±1.33$^{a}$ | 14.21±6.84$^{b}$ | 0.00±0.00$^{a}$ | * |
| Week 16 – 17 | 1.54±1.54$^{a}$ | 8.58±2.68$^{b}$ | 1.82±1.82$^{a}$ | 2.22±2.22$^{a}$ | * |
| Week 17 – 18 | 1.67±1.67$^{a}$ | 2.00±2.00$^{a}$ | 0.00±0.00$^{a}$ | 11.50±3.22$^{b}$ | * |
| Week 18 – 19 | 2.99±1.90 | 3.67±2.26 | 1.67±1.67 | 0.00±0.00 | NS |
| Week 19 – 20 | 13.09±2.05$^{b}$ | 5.98±2.52$^{a}$ | 2.00±2.00$^{a}$ | 0.00±0.00$^{a}$ | * |

LOS = level of significant, $^{ab}$ = value with different superscripts in the same row are significantly (P<0.05) different, NS = not significant, * = significant at 5 percent probability.

# DISCUSION

**Body weight**

The significant effect of batch of hatch on growth performance obtained in this study strongly agrees with the report of Mancha (2004) and Momoh *et al.,* (2007) who observed that, differences in live weight in local chicken could varies due to locations, batches, environment, crossbreeding/family level preference, isolation and selection. Also, this result agrees with the report of Desha *et al.,* (2016) who reported that batch of hatch had significant effects on body weight of Bangladesh local chicken. The mean body weights across batches of hatch from weeks 1- 8 were lower than the values reported by Gwaza *et al.,* (2015) for both the Tiv and the Fulani chicken ecotypes. The mean body weight for the Tiv ecotype obtained at hatch across batches in this study strongly corroborated with the value of 23±1.60 g reported by Adedokun and Sonaiya (2001) and fall within the range of 22.22 g to 43.00 g reported by Anang *et al.,* (2001) for some local chicken in Nigeria. Momoh (2005) reported 24.27±0.05 g and 30.23±0.06g as hatch weight for the Nigerian light and heavy chicken ecotypes. Halima (2007) reported a slightly higher value of 27.30 g as body weight at hatch. Woanski *et al.,* (2006) reported that hatch weight is a function of egg weight (size) prior to incubation. These authors opined that, heavier eggs contain more nutrients than small or medium sized eggs and as a result, chicken from heavier eggs tend to have more yolk attachment at hatching. This is expected since there is strong correlation between egg weight and chick hatch weight (Ndofor-Foleng *et al*., 2015). At week 4, the mean body weight in all batches are far lesser than 92±2.10 g, 104±14.50 g and 157.16±0.45 g reported by Nwosu and Asuquo (1985), Adedokun and Sonaiya (2001) and Momoh (2005), respectively for Nigerian local chicken. However, at week 8, mean body weight obtained in this study across batches of hatch are similar to 262±4.8 and 289±2.2 g reported by Adedokun and Sonaiya (2001) and Nwosu and Asoquo (1985) but lower than 349.88±3.01 g reported by Momoh (2005) for Nigerian heavy chicken ecotypes. These observed differences could be due to environment, season, management practice, strain and selection among others. The body weight at week 12 for Tiv and Fulani ecotype is far less than 589±4.4 and 605±67.5 reported by Nwosu and Asuquo (1985) and Adedokun and Sonaiya (2001). The body weight at week 16 acros batches is fairly similar to the value of 744±0.01 and 765±103.4 reported by Nwosu and Asuquo (1985) and Adedokun and Sonaiya (2001). Body weight at week 20 considered to be matured weights in all batches fall within the range of 980 to 1,420 g and 870-1,900 g reported by Atteh (1990) and Essien and Joy (2003), respectively for Nigerian local chicken. This result is also very similar to the value of 948±130.6 and 980±4.1 g reported by Adedokun and Sonaiya (2001) and Nwosu and Asuquo (1985) for Nigerian local chicken at 20 week of age. Mancha (2004) observed 1.38±0.05 kg as matured body weight of local chickens in Jos, Plateau State. At maturity, live weight changes with natural processes, production status, management practices and seasonal changes (Essien and Joy, 2003). Mancha (2004) stated that under similar management and seasons, body weight difference could be due to variation in additive genetic variance. The author also opined that body size differences could occur between populations due to environment, cross breeding and development through progressively family-level selection especially when such populations are isolated. The result of effect of batch of hatch on hatch weight and subsequent weekly body weight demonstrated that weekly hatches for about four consecutive hatches can be taken as the same age group. This implies that in rural settings where large numbers of eggs can not be hatched at once due to small flock sizes, chicks from two to four consecutive hatches can be managed together to achieve uniform growth and development. Also, several batches of hatch have revealed several genetic characteristics within the birds which could be utilized for genetic improvement through selection.

**Body weight gain, growth rate and mortality rate**

There were significant ($P<0.05$) effect of batch of hatch on weekly body weight gain (ADBWG) as revealed in the present study. The body weight gains for Tiv ecotype across batches obtain in this study between hatch to week 8 is similar to 157g reported by Tadelle and Ogle (2001) on performance of Ethiopian local chickens under the farmer's management condition in central highland of Ethiopia but lower than 186.23 g reported by Momoh (2005) as the body weight gain of the Nigerian local chicken (heavy ecotype) at 4-8 weeks old. This value, when compared to the performance of other African heavy indigenous ecotypes, was lower than the mean body weight gain value of 212 g reported by Tadelle *et al.,* (2003) as mean body weight gain at eight weeks old in local chicken ecotype in Ethiopia under on-station management. The differences observed could have been caused by genetic differences, management, environment and other non-genetic factors.

Growth rates were very slow initially in all batches (during 0-7 week of age) but became faster as the birds advanced in age. The pattern of growth rate observed in this study is similar to the findings of Aboul-Hassan (2001) and Aboul-Seoud (2008) who reported that highest growth rate was noted toward maturity in Japanese quails.

Mortality rate obtained in this study decreases with advancing age as similarly reported by Momoh (2005). The percent mortality rates for the Fulani and Tiv ecotypes from hatch to 8 week of age were lower than range of 11% to 14% reported by Momoh (2005) as the percentage chick mortality during the chick period (0-8week) in the three genetic groups of

Nigerian local chickens with no significant difference among the genetic groups. However, the mortality rate across batches from week 8 -20 are within the range of 1 to 7% reported by Momoh (2005).

## CONCLUSION

Batch of hatch had significant (P<0.05) effect on weekly body weight, body weight gains, growth rate and mortality rate at day old and subsequent weeks until maturity. Birds in batch 1 had significantly (P<0.05) higher weekly body weight, body weight gain and growth rate at hatch, weeks 1, and 3 while birds in batches 3 and 4 had significantly (P<0.05) higher body weight from weeks 4 up to week 20. For mortality rate, batches 2 and 4 had significantly (P<0.05) lower mortality rate compared to batch 1 and 3 at initial age but toward maturity (from 7 weeks of age), batches 1 and 2 had significantly (P<0.05) lower mortality rate compared to batches 3 and 4.

From the findings of this research, it is recommended that the genetic diversity across batch of hatch within the Tiv chicken ecotype observed in this study should be exploited through selection within each ecotype and subsequent crossing between birds from different batch of hatch/ecotype to take advantage of heterosis.

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