EFFECT OF PLUMAGE COLOUR ON BODY WEIGHT AND BODY MEASUREMENTS OF MUSCOVY DUCKS IN MAIDUGURI, BORNO STATE, NIGERIA.

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ABSTRACT
This research was carried out to determine the effects of plumage colour on body weights and body linear measurements of Muscovy ducks, within Maiduguri metropolis. The information collected were plumage colour, body weight and linear body measurements, from 0-9 weeks at weekly interval. Data collected were analyzed using the statistical package for social science (SPSS) and significant means were separated by the Duncan's multiple range tests. The results obtained showed that the mean body weight from 0-9 weeks ranged from 32.87 g to 1282.40 g *respectively. Three plumage colors are recorded; White, multicoloured and Black and White. The highest body weights and body measurements among the three plumage colours were recorded for multicoloured but had no significantly (P>0.05) effect with the other plumage colors in all ages measured. However, improvement in body weight and body measurements of Muscovy duck up to nine weeks of age can be achieved with white, multicoloured and white and black plumage colour.*

Keywords: Plumage Colour, Body Weight, Body Measurement, Body Length, Muscovy Duck.

Introduction
Duck is one of the indigenous poultry species in Nigeria and its production is at the rudimentary stage (Oguntunji and Ayorinde, 2015a). Ducks have contributed greatly in the improvement of the nutritional standard of human population (Pingel, 2009). Ducks have unique advantage over chicken by utilizing foodstuffs that normally go unharvested, control harmful insects, slugs, snails and unwanted aquatic plants, thrive under harsh condition with limited shelters, resist diseases and parasites and also converts feed efficiently (Adzitey and Adzitey, 2011). Despite the numerous advantages of local Muscovy ducks over chickens, there is still a general lack of interest in their production in sub-Saharan Africa, including Nigeria (FAO, 1999). Muscovy make up about 74% of the ducks in Nigeria, its meat has less fat and is considered to be healthier (Adesope and Nodu, 2002). Ferdus (1999) reported that increased duck rearing would be a great supplement to total poultry production since they will not interfere with chicken rearing due to different rearing and scavenging venues. Moreover, duck rearing would increase employment opportunities as well as provide a source of income to the rural women, landless and marginal farmers (Raji *et al.,* 2009). Body weight of live animals is the most reliable measure of growth performance and the significance of linear body measurements of animals has been emphasized. It is especially used for predicting live weight and relationships with other body morphometric traits (Adewunmi *et al.,* 2006). Knowing the body weight of ducks is important for a number of reasons such as breeding, correct feeding and health (Keskin *et al.,* 2005).

Materials and Methods
The study was carried out in Maiduguri the capital city of Borno state which is located on longitude 13.15º' East and latitude 11.83º' north and at an altitude of 345 meters above sea level (Encarta, 2007). It falls within the Sahel region of West Africa, which is characterized by fluctuating climatic and seasonal variations. The area has a very short period (3 – 4 months) of rainfall, recording 645.9 mm/annum, with a long dry season of about 8 – 9 months (Aliyu *et al.,* 2013).

The ambient temperature could be as low as 20º C during the dry cold season in December- January and as high as 44º C during the dry hot season in April and May. Relative humidity is 45% in August which usually lowers to about 5% in December and January. Day length varies from 11 to 12 hours (Aliyu *et al.,* 2013).

A total of ten (10) sires and thirty (30) dams were used to produce about 300 ducklings which were used for the experiment. All of the sires and dams were managed intensively up to the point of hatching, the offspring's were vaccinated against Gumboro and New castle disease up to four weeks of age and then allowed to roam freely during the day to scavenge for food and pastures and their meals are supplemented

with kitchen wastes and agro industrial by-products. In the evening, the ducks were housed in shelters provided for protection against predators and harsh weather conditions. The ducklings were individually tagged using a permanent marker under their wings to enhance accuracy of measurements which were closely monitored and reapplied every time the birds were measured throughout the experiment. The body weight and body measurements of ducklings was determined using a top loading weighing scale (g) Their records were taken on weekly basis from day old to six (9) weeks of age. Plumage colours were also determined visually. The data were analyzed using the general linear model of SPSS 22.0. Significant means were separated by the Duncan's multiple range tests.

Results and Discussion

The least squares means and standard errors of body weight and body measurements of Muscovy ducks as affected by plumage colour are presented in Tables 1 and 2. There were no significant (P>0.05) differences observed in body weight and linear body measurements among the plumage colours at all ages. This shows that, there is no variation in body weight and morphometric traits among these ducks and may be attributed to inbreed mating among the colours of ducks and the same genotypes and no deliberate selection was carried out on body weight and linear measurements. Plumage colour had no effect on body weight, back length, body circumference, pelvic width of indigenous chicken of Bangladesh (Tabassum *et al*., 2014).

These results differ from those of Raji *et al*. (2009) who reported that the mean body weight of four plumage colours of ducks differed significantly and ranged from 1.92 to 2.64 kg. The authors reported the highest body weight was observed in the multicolored. The results also differ from those of Fisinin and Zlocherskay (1980) who reported that the white and black Muscovy ducks had the highest body weight and linear body measurements. In other poultry studies, significant effect of plumage colour on body weight of indigenous chickens of Bangladesh was reported by Sarker *et al*. (2014). Similarly, Zannah *et al*. (2021) also reported significant effect of plumage colour on body weight of domestic pigeon. Apuno *et al*. (2011) observed a significant plumage colour effects on body length, breast girth and shank length of Nigerian indigenous chickens except for body weight. Likewise, Onasanya *et al*. (2018) revealed that plumage pigmentation affects most of the econometric traits of extensively managed Nigerian indigenous chickens. However, Shahjahan *et al*. (2011) found significant effect of specific plumage colours and age groups on egg production of indigenous chicken. Similar observation was also made by Faruque *et al*. (2013) in local chickens.

Conclusion

There was no plumage colour variation on body weight and linear body measurements of Muscovy ducks at all ages. Therefore, Further investigations under controlled experiments with large sample sizes are needed for validation of the reported non connotation of plumage colours with body weight and body linear measurement of Muscovy duck.

Table 1: **Least Squares Means ±S.E of Body Weight and Body Measurements of Muscovy Ducks as Affected by Plumage Colour from 0 to 4 Weeks of Age**

Colors	Traits	Weeks				
		0	1	2	3	4
White	BW	33.13±1.89	75.77±7.97	129.30±19.86	203.67±38.75	335.79±40.76
Black White	BW	32.87±1.26	72.45±5.31	120.42±13.24	186.35±25.83	327.00±27.17
Multi	BW	34.17±0.91	79.27±3.81	137.16±19.51	224.48±18.55	366.81±19.51
White	BL	6.88±0.27	9.73±0.48	11.63±0.94	13.29±1.10	15.63±1.02
Black White	BL	6.89±0.18	9.46±0.32	11.36±0.62	13.44±0.73	15.55±0.68
Multi	BL	7.06±0.13	10.12±0.23	12.28±0.45	15.12±0.53	16.49±0.49
White	CG	6.21±0.35	9.38±0.61	10.93±0.97	12.02±0.98	15.84±1.49
Black White	CG	6.40±0.23	9.00±0.40	10.59±0.65	12.56±0.66	15.10±1.00
Multi	CG	6.55±0.17	9.78±0.29	11.74±0.47	13.72±0.47	14.38±0.72
White	SL	1.50±0.09	1.87±0.16	2.03±0.17	2.28±0.15	2.81±0.12
Black White	SL	1.43±0.06	1.83±0.11	1.97±0.11	2.24±0.10	2.63±0.08
Multi	SL	1.43±0.04	1.92±0.08	2.09±0.08	2.36±0.07	2.73±0.06

White	SC	0.76±0.14	1.36±0.23	1.97±0.27	2.82±0.18	3.14±0.14
Black White	SC	0.86±0.09	1.47±0.16	1.96±0.18	2.81±0.12	3.13±0.09
Multi	SC	0.85±0.07	1.54±0.11	2.23±0.13	2.74±0.09	3.19±0.08
White	DL	2.94±0.17	3.96±0.22	4.55±0.30	5.03±0.27	5.74±0.30
Black White	DL	2.85±0.11	3.92±0.15	4.33±0.20	5.00±0.18	5.79±0.20
Multi	DL	2.81±0.08	3.96±0.10	4.53±0.14	5.43±0.13	6.05±0.14
White	DC	1.87±0.12	2.79±0.25	3.27±0.26	4.08±0.29	5.11±0.35
Black White	DC	1.73±0.08	2.57±0.17	3.28±0.18	3.98±0.19	4.85±0.23
Multi	DC	1.83±0.06	2.97±0.12	3.60±0.13	4.41±0.14	5.13±0.17
				Weeks		
		5	**6**	**7**	**8**	**9**
White	BW	498.49±57.90	673.68±58.38	843.92±68.40	983.30±86.83	1157.50±90.04
Black White	BW	481.41±38.59	637.17±38.92	803.15±45.60	950.90±57.88	1135.80±60.02
Multi	BW	533.31±27.72	718.95±27.95	895.42±32.75	1089.20±41.57	1282.40±43.12
White	BL	17.68±1.10	18.93±1.12	20.33±0.92	21.36±0.89	23.21±0.88
Black White	BL	17.29±0.73	18.54±0.74	20.57±0.61	21.67±0.59	23.18±0.59
Multi	BL	18.28±0.53	19.96±0.53	21.28±0.44	22.55±0.43	24.16±0.42
White	CG	16.22±0.81	18.63±1.16	20.11±0.81	21.58±0.99	24.05±1.09
Black White	CG	16.50±0.54	18.17±0.77	20.46±0.54	21.95±0.66	23.36±0.73
Multi	CG	17.12±0.39	19.63±0.56	21.71±0.39	22.94±0.48	25.23±0.52
White	SL	3.14±0.14	3.32±0.12	3.76±0.22	4.08±0.30	4.63±0.28
Black White	SL	3.01±0.09	3.29±0.08	3.52±0.15	3.75±0.20	4.36±0.19
Multi	SL	3.08±0.06	3.38±0.06	3.71±0.11	4.12±0.15	4.53±0.14
White	SC	3.82±0.18	3.78±0.18	4.14±0.17	4.42±0.21	4.95±0.27
Black White	SC	3.52±0.12	3.73±0.12	4.05±0.12	4.32±0.14	4.75±0.18
Multi	SC	3.59±0.09	3.80±0.09	4.09±0.08	4.45±0.10	4.77±0.13
White	DL	6.93±0.37	8.04±0.38	8.70±0.40	9.37±0.58	10.96±0.61
Black White	DL	6.58±0.24	7.79±0.25	8.58±0.26	9.27±0.39	10.40±0.40
Multi	DL	7.01±0.17	8.44±0.18	9.20±0.19	9.43±0.28	10.74±0.29
White	DC	6.02±0.43	6.94±0.50	8.21±0.46	9.37±0.58	10.96±0.61
Black White	DC	5.74±0.28	6.80±0.33	8.04±0.31	9.27±0.39	10.40±0.40
Multi	DC	6.09±0.20	7.07±0.24	8.02±0.22	9.43±0.28	10.74±0.29

BW: Body Weight, BL: Body Length, CG: Chest Girth, SL: Shank Length, SC: Shank Circumference, DL: Drumstick Length, Drumstick Circumference and Means were all Non-significant.

References

Adesope, O.M. and Nodu, M.B. (2002). A note on acceptance of duck as table-meat among inhabitants of selected communities in the Niger Delta zone, Nigeria. *Livestock Research for Rural Development*, 14 (6): 1 -3.

Adzitey E. and Adzitey, S.P. (2011). Duck production has a potential to recue poverty among rural household in Asia communities: A review. *Journal of World's Poultry Research,* 1:7 – 10.

Aliyu, J. (2013). Productivity assessment of four strains of indigenous chicken in a Semi-arid region of north-eastern Nigeria. *Ph.D. thesis, Department of Animal Science, University of Maiduguri, Maiduguri,* Nigeria.

Apuno, A. A., Mbap, S. T. and Ibrahim, T. (2011). Characterization of local chickens (*Gallus gallus domesticus*) in Shelleng and Song Local Government Areas of Adamawa State, Nigeria. *Agriculture and Biology Journal of North America,* 2(1): 6-14.

Encarta. (2007). *Encarta Microsoft @ student 2007(DVD).* Redmond, WA: Microsoft corporation.

Faruque, S., Islam, M.S., Afrozi, M.A. and Rahman, M.M. (2013). Evaluation of the performance of native chicken and estimation of heritability for body weight. *Journal of Bangladesh Academy Science,* **37**(1): 93-101.

Ferdus, A.J.M. (1999). Reproduction, growth and meat yield performance of different genotypes of ducks. *M.Sc. Thesis, Department of Poultry Science, Bangladash Agricultural University.*

Fisinin, V. I. and Zlochevskaya, K. V. (1980). Breeds of ducks in the Soviet Union. *Article*, 15: 507 – 515.

Keskin, S., Daskiran, I. and Kor, A. (2005). Factor analysis scores in a multiple linear regression model for the prediction of carcass weight in Akkeci kids. *Journal of Applied Animal Research,* 3: 1201 – 1204.

Oguntunji, A. O. and Ayorinde, K. L. (2015a). Duck production in Nigeria: flock characteristics, management and mortality. *Archiva Zootechnica,* 18 (1): 27-40.

Onasanya, G. O., Ikeobi, C. O. N. and Amusan, S. A. (2018). Morphostructural Profiling of Comb Types and Plumage Pigmentation and Their Influences on Ecometric Traits of Extensively-Managed Nigerian Indigenous Chickens. *Nigerian Journal of Animal Science and Technology*, 1(2):10 – 17

Pingel, H. (2009). Waterfowl production for food security. *Proceedings of the 4th World Waterfowl Conference* 11 – 13 November, 2009, Thrissur, India, 5-15.

Raji A. O., Igwebuike, J. U. and Usman, M.T. (2009). Zoometrical Body Measurements and Their Relation with Live Weight in Matured Local Muscovy Ducks in Borno State, Nigeria. *ARPN Journal of Agricultural and Biological Science*, 4(3): 58 – 62.

Sarker, N. R., Hoque, A., Faruque, S., Islam, N. and Bhuiyan, F. H. (2014). An *ex -situ* study on body characteristics and effects of plumage color on body weight of indigenous chicken (*Gallus domesticus*) in Bangladesh. *Animal sciences*, 36: 79-84.

Shahjahan, M., Amin, M. R. and Bhuiyan, A. K. F. (2011). Diversity in performance of indigenous chicken in some selected areas of Bangladesh *In-situ*. *Proceedings of 9th Asia pacific poultry conference of the world's poultry science Association Taiwan Branch*, 20-23 March, 2011. Taipei, Taiwan.

Tabassum, F., Hoque, M. A, Islam, F., Ritchil, C. H, Faruque, M. O. and Bhuiyan, A. K. F. (2014). Phenotypic and morphometric characterization of indigenous chickens at Jhenaigati Upazila of Sherpur district in Bangladesh. *SAARC Journal of Agriculture*, 12(2): 154-169.

Zannah, B. B., Aliyu, J. and Alade, N. K. (2021) Effect of plumage colour, shank colour and shank type on body weights of domestic pigeon squabs (*Columba livia*) in Maiduguri, Borno state, Nigeria. *In: Proceedings of the 46th Annual Conference of the Nigerian Society for Animal Production March 14 -18*, Pp. 822-827. ISBN: 978-978-990-138-8.