EFFECT OF SEX ON BODY WEIGHT AND BODY MEASUREMENTS OF MUSCOVY DUCKS IN MAIDUGURI, BORNO STATE, NIGERIA

Yusuf, M. J., Aliyu, J., Raji, A. O., Zannah, B. B. and Mukaddas, J.
Department of Animal Science, University of Maiduguri, Borno State, Nigeria.
Corresponding Author: +2348068706717, yusufjallaba@gmail.com

Abstract
This research was carried out to determine the effects of sex on body weights and body measurement of Muscovy ducks, within Maiduguri metropolis. The information collected were sex, body weight and body measurements from 0-20 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 showed that the Muscovy ducks did not exhibit sexual dimorphism at the early (0 to 4 weeks) stage of growth. However, the drakes had significantly (P<0.05) higher body weight and most body measurements at later ages (5 to 20 weeks) except for shank circumference, the linear body measurements were not significant (P>0.05) until at 9th weeks of age. The results obtained also revealed that drake ducklings were superior (p<0.05) to the duck ducklings for body weight at all ages studied. However, improvement in body weight and body measurement of Muscovy ducks up to twenty weeks of age can be achieved with sexual dimorphism at the later age.
Keywords: Sex, Body Weight, Muscovy Duck, Chest Girth, Shank Length.

Introduction

In Nigeria, the duck population was ranked third (9,553,911) after chicken (101,676,710) and guinea fowl (16,976,907) (Hassan and Mohammed, 2003). The Muscovy duck (*Cairina moschata*) is a common household bird among rural dwellers in Nigeria and play significant role as a source of protein and income to peasant farmers. Muscovy ducks make up 74% of the ducks in Nigeria, and its meat is low in fat and considered to be healthier (Adesope and Nodu, 2002). It is known for its hardiness, resistance to environmental stress, very prolific, resistant to common poultry diseases and less exigent to feed quality (Yakubu *et al.,* 2011). They lay many and large eggs and have rapid growth rate and high dressed weight of drakes (Duru *et al.,* 2006). Therefore, 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. Sex is an excellent source of variation for live body weight and other economic traits of indigenous poultry (Onasanya *et al*., 2018). Sexual dimorphism has previously been reported in favour of the male in duck (Raji *et al*., 2009) and pheasants (Gorecki *et al*., 2012). However, there has been no deliberate attempt to improve the performance of Muscovy ducks despite its immense importance to the rural poor as a source of food and money (Ogah and Ari, 2012). There is a dearth of information on the effect of sex on body weight of Muscovy ducks. This inadequate information greatly hinders selection program, optimization of breeding schemes, and enhanced prediction of response to selection.

MATERIALS AND METHODS

The study was carried out in Maiduguri the capital city of Borno state which is located on longitude 13.15^{o}' East and latitude 11.83^{o}' 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, 2013).

The ambient temperature could be as low as 20^{o} C during the dry cold season in December- January and as high as 44^{o} 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, 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 of ducklings was determined using a top loading weighing scale (g) Their records were taken on

weekly basis from day old to six (6) weeks of age. Sex was also determined visually and via sexing. 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 sex are presented in Table 1. The results showed that the Muscovy ducks did not exhibit sexual dimorphism at the early (0 to 4 weeks) stage of growth. However, the drakes had significantly ($P<0.05$) higher body weight and most body measurements at later ages (5 to 20 weeks) except for shank circumference. The average body weights of drakes and ducks at the early (0 – 4 weeks) stage of growth ranged from 34.33 to 365.19 and 32.46 to 321.21 g, at middle age (5 – 10 weeks) ranged from 564.69 to 1556.20 g and 444.12 to 1129.10 g, and older age of 12 – 20 weeks were 1687.40 to 2146.40 g and 1213.80 to 1505.80 g, respectively. However, the linear body measurements were not significant ($P>0.05$) until at 9th weeks of age. Body length, drumstick length and circumference were significant ($P<0.05$). The values at 9 – 20 weeks of age ranged from 24.30 – 32.50 cm in male, and 22.72 – 29. 97 cm in female for body length, for drumstick length 10.91 – 19.04 cm in male and ranged of 10.48 – 16.01 cm in female while the range for drumstick circumference were 12.45 – 19.04 cm in males and 11.33 – 16.01 cm in female, respectively. Chest girth and shank length were significant ($P<0.05$) at 12 – 20 weeks of age and the values ranged from 28.05 – 32.64 cm for chest girth in males and 26.68 – 30.73 cm in females while the range in shank length were 6.13 – 6.83 cm in male and 5.45 – 6.52 cm in females. Shank circumference however was not significant ($P>0.05$) at all age between the sex.

Sexual dimorphism in favour of mature drakes has been reported for body weight and linear body measurements (Etuk *et al*., 2006; Raji *et al*., 2009; and Yakubu *et al*., 2009). The significant differences in favour of males in this study were in consistent with the reports of previous studies on Muscovy ducks reported by Oguntunji and Ayorinde (2014); Yakubu *et al*. (2009); Ogah *et al*. (2011a) and Yakubu *et al*. (2015). The results of this study are similar to those of Ogah and Kabir (2014) who recorded values of 1.35, 2.40 and 2.69 kg for body weight at 10, 15 and 20 weeks of age. The corresponding body measurements were 26.40, 36.68 and 47.87 cm for body length and 26.85, 33.07 and 39.33 cm for breast circumference at 10, 15 and 20 weeks of age in male and female Muscovy ducks, respectively. Body weight of drakes and ducks at the age of 12 weeks (5383 g and 2874 g), were observed by Kleczek *et al*. (2007) in Muscovy duckling. The differences in body weight and linear body measurements between sex could be attributed to more efficient feed conversation of the drakes. The significance observed at the older ages, implies that there is a differential response of the sexes to the same environmental conditions.

Conclusions

The sexual dimorphism which was in favour of males was noticed from 5, 9, 12 and 14 weeks of age for body weight, body length, drumstick circumference, chest girth and shank length, respectively. The significant variation observed at the later ages implies that factors which cause variation in measurements of ducks were not manifest at the early ages. There is need for the improvement of growth performance of Muscovy ducks in order to boost their production through family selection.

Table 1: **Means and Standard Errors of Body Weight (g) and Body Measurements (cm) of Muscovy Ducks as Affected by Sex**

Weeks	Sex	BW	BL	CG	SL	SC	DL	DC
0	Male	34.33±1.27	7.02±0.18	6.42±0.23	1.50±0.06	0.80±0.10	2.96±0.11	1.74±0.08
	Female	32.46±0.92	6.87±0.13	6.36±0.17	1.41±0.05	0.84±0.07	2.77±0.08	1.88±0.06
1	Male	73.19±5.34	9.36±0.32^{b}	8.90±0.41	1.81±0.11	1.34±0.16	3.80±0.15	2.57±0.17^{b}
	Female	78.46±3.87	10.18±0.23^{a}	9.87±0.30	1.94±0.08	1.58±0.11	4.09±0.11	2.98±0.12^{a}
2	Male	132.26±13.30	11.75±0.63	10.88±0.65	1.92±0.11	1.91±0.18	4.34±0.20	3.26±0.18
	Female	125.66±9.66	11.77±0.45	11.30±0.47	2.14±0.08	2.20±0.13	4.60±0.15	3.51±0.13
3	Male	203.71±25.95	13.61±0.74	12.76±0.66	2.21±0.10	2.79±0.12	4.98±0.18	3.96±0.19
	Female	205.96±18.84	14.28±0.54	12.77±0.48	2.37±0.07	2.79±0.09	5.32±0.13	4.36±0.14
4	Male	365.19±27.30	15.52±0.68	15.82±1.00^{a}	2.71±0.08	3.13±0.09	5.73±0.20	4.94±0.23

	Female	321.21±19.82	16.26±0.49	14.39±0.73[b]	2.74±0.06	3.17±0.07	5.99±0.15	5.11±0.17
5	Male	564.69±38.77[a]	17.23±0.73	16.50±0.54	3.12±0.09	3.54±0.12	6.65±0.24	5.83±0.29
	Female	444.12±28.15[b]	18.27±0.53	16.73±0.40	3.04±0.07	3.54±0.09	7.03±0.17	6.07±0.21
6	Male	760.28±39.90[a]	18.67±0.75	18.81±0.78	3.37±0.08	3.79±0.12	8.33±0.25	6.96±0.34
	Female	592.92±28.38[b]	19.62±0.54	18.80±0.86	3.29±0.06	3.75±0.09	7.85±0.18	6.91±0.24
7	Male	954.62±45.80[a]	20.80±0.62	20.87±0.54	3.74±0.15	4.15±0.12	8.86±0.27	8.36±0.31
	Female	740.38±33.26[b]	20.65±0.45	20.65±0.39	3.59±0.11	4.04±0.08	8.77±0.19	7.82±0.22
8	Male	1143.00±58.14[a]	22.26±0.60	22.67±0.66	4.08±0.20	4.45±0.14	9.79±0.39	9.79±0.39
	Female	872.50±42.21[b]	21.46±0.43	21.64±0.48	3.89±0.15	4.34±0.10	8.93±0.28	8.93±0.28
9	Male	1365.60±60.29[a]	24.30±0.59[a]	24.58±0.73	4.66±0.19	4.91±0.18	10.91±0.41[a]	10.91±0.41
	Female	1018.20±43.77[b]	22.72±0.43[b]	23.84±0.53	4.35±0.14	4.74±0.13	10.48±0.30[b]	10.48±0.30
10	Male	1556.20±52.50[a]	25.80±0.59[a]	26.76±0.60	4.99±0.19	5.30±0.22	12.45±0.40[a]	12.45±0.40[a]
	Female	1129.10±38.11[b]	23.78±0.43[b]	25.37±0.43	4.67±0.14	5.16±0.16	11.33±0.29[b]	11.33±0.29[b]
12	Male	1687.40±48.61[a]	27.29±0.53[a]	28.05±0.53[a]	5.41±0.20	5.59±0.25	14.04±0.40[a]	14.04±0.40[a]
	Female	1213.80±35.29[b]	25.07±0.38[b]	26.68±0.39[b]	4.99±0.14	5.63±0.18	12.19±0.29[b]	12.19±0.29[b]
14	Male	1835.40±47.66[a]	28.40±0.56[a]	29.32±0.53[a]	6.13±0.22[a]	6.12±0.24	15.41±0.38[a]	15.41±0.38[a]
	Female	1281.40±34.60[b]	26.43±0.41[b]	27.57±0.39[b]	5.46±0.16[b]	6.02±0.18	12.96±0.28[b]	12.96±0.28[b]
16	Male	1933.80±48.47[a]	29.96±0.55[a]	30.22±0.59[a]	7.08±0.23	6.54±0.25	16.83±0.41[a]	16.83±0.41[a]
	Female	1348.50±35.19[b]	27.44±0.40[b]	28.32±0.43[b]	5.78±0.16[b]	6.43±0.18	13.85±0.30[b]	13.85±0.30[b]
18	Male	2051.00±47.43[a]	31.34±0.61[a]	31.42±0.76	6.50±0.22[a]	6.77±0.25	17.78±0.39[a]	17.78±0.39[a]
	Female	1421.00±34.44[b]	26.66±0.44[b]	29.91±0.55	6.28±0.16[b]	6.73±0.18	15.12±0.28[b]	15.12±0.28[b]
20	Male	2146.40±49.21[a]	32.50±0.58[a]	32.64±0.69[a]	6.83±0.22[a]	7.16±0.24	19.04±0.38[a]	19.04±0.38[a]
	Female	1505.80±35.73[b]	29.97±0.42[b]	30.73±0.50[b]	6.52±0.17[b]	7.03±0.17	16.01±0.28[b]	16.01±0.28[b]

BW: Body weight, BL: Body Length, CG: Chest Girth, SL: Shank Length. [a,b] Means within the same column with different superscripts are significantly ($P<0.05$) different from each other.

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