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Growth performance of lavender, pearl grey, royal purple and white varieties of domesticated helmeted guinea fowl (*Numida meleagris*) raised under intensive management system in Botswana

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The objective of this study was to evaluate growth performance of pearl grey, lavender, royal purple and white varieties of helmeted guinea fowl (*Numida meleagris*) raised under intensive management system. A total of 47, 43, 37 and 30 guinea fowls of pearl grey, lavender, royal purple and white varieties, respectively, were evaluated for growth performance. The guinea fowls were raised under deep litter management system and were given commercial broiler feeds and drinking water *ad libitum*. Growth performance was measured fortnightly as changes in body weight of individuals from 4 weeks to 18 weeks of age. Body weight increased continuously in both males and females of the four varieties of helmeted guinea fowl from 4 to 18 weeks of age. There were no significant sex differences in body weight among the four varieties. There were also no significant differences in body weight between males of the four varieties at all ages. Pearl grey, lavender and royal purple females had similar body weights at all ages while royal purple females were significantly heavier than their white counterparts at 16 and 18 weeks of age (1390.36±37.42 g vs. 1167.00±43.88 g) and (1471.09±30.83 g vs. 1230.50±36.15 g) respectively. Royal purple males and females had the highest body weight at 18 weeks of age and white males and females had the lowest. The royal purple variety therefore has the greatest potential for possible selection of meat type guinea fowl.

Key words: Botswana, growth, guinea fowl, intensive management, varieties

INTRODUCTION

Guinea fowl production in Botswana is still at its infancy stage but is considered an important avenue for the diversification of the poultry sector (Moreki et al., 2012). In Botswana, guinea fowls are mostly reared for their meat and for income generation through sale of live birds. The demand for guinea fowl meat worldwide has been driven by increased demand for leaner animal protein sources and guinea fowl meat is valued for its taste or gamey flavor and nutritional properties (Baeza et al., 2001). The production of guinea fowl as an alternative to

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Table 1. Nutritional composition of feeds given to the guinea fowls.

Composition	Broiler starter crumbs (g/kg)	Broiler grower pellets (g/kg)
Protein	200	180
Moisture	120	120
Fibre	50	60
Calcium	8	7
Fat	25	25
Phosphorus	6	5.5
Lysine	12	10

Source: Author

chicken is increasing throughout the world but its profitability is hampered by poor production and productivity efficiencies due in part to lack of management and feeding regimens (Dahoudau et al., 2009). Very little scientific research has been done on production, management and improvement of guinea fowl compared to chickens (Maphosa et al., 2002; Machadeyi et al., 2004).

A pre-requisite to genetic improvement of guinea fowl is the characterization of different varieties of guinea fowl in traits of economic importance such as growth potential. Understanding the growth characteristics and patterns of different varieties of guinea fowl will permit the design of nutritional or feeding regimens that will allow efficient use of feed and increased profitability (Nahashon et al., 2006) and it can be used for further selection, and for the development of either meat or layer type guinea fowl**.** Varieties of domesticated helmeted guinea fowl found in Botswana include the pearl grey, lavender, royal purple and white (Moreki and Seabo, 2012) and their growth potential under intensive management system has never been evaluated. The objective of this study was therefore to evaluate growth performance of pearl grey, lavender, royal purple and white varieties of helmeted guinea fowl raised under an intensive management system in Botswana.

MATERIALS AND METHODS

Study area

The study was carried out at the Botswana University of Agriculture and Natural Resources, Content Farm, Sebele from January to August 2013. This site is at an altitude of 994 m above sea level and the coordinates are latitude 24° 33'S and longitude 25° 54' E. The average daily temperature during the study period was 26°C and the average relative humidity was 55%.

Production of experimental animals

A total of 100 fertile eggs produced by each of the four varieties (lavender, pearl gray, royal purple and white) of helmeted guinea fowl were collected separately over 4 consecutive days from Botswana University of Agriculture and Natural Resources guinea fowl rearing unit. The eggs were incubated for 28 days at 37.5°C and 65% relative humidity following the manufacturer's recommendations for the operation of the incubator. The resulting guinea fowl keets were used to evaluate growth performance of lavender, pearl grey, royal purple and white varieties from 4 to 18 weeks of age.

Management of experimental birds

Fifty day-old keets of each of the four varieties were raised in separate brooding units until 4 weeks of age. During the brooding phase, keets were feed commercial broiler starter crumbs and were provided with drinking water *ad libitum*. At 4 weeks of age, keets were individually identified using leg bands. Five keets of each of the four varieties of helmeted guinea fowl were then housed together in a rearing pen for a total of 10 rearing pens resulting in 10 replications. Thereafter the birds were fed commercial broiler grower pellets and given drinking water *ad libitum* until 18 weeks of age. Birds were raised under natural light (~12 h light and 12 h dark periods) throughout the study. Feeders and drinkers were cleaned on a daily basis to avoid contamination and transmission of diseases. The nutritional compositions of feeds given to the guinea fowls during the brooding and growing phases are shown in Table 1.

Measurement of growth performance

Due to mortality during the study period, of the initial fifty guinea fowls of each of the four varieties, a total of 47 (22 females and 25 males) pearl gray, 43 (23 females and 20 males) lavender, 37 (19 females and 18 males) royal purple and 30 (16 females and 14 males) white guinea fowl were eventually used for evaluation of growth performance in the four varieties of helmeted guinea fowl. Growth performance was measured as changes in body weight from 4 weeks to 18 weeks of age. Body weight was measured on individual guinea fowls fortnightly from 4 weeks to 18 weeks of age using an electronic balance. Guinea fowls were sexed at 18 weeks by visual examination of the wattles and were also retrospectively sexed using gonads after slaughter.

Statistical analysis

Growth data were analyzed by General Linear Models procedures of SAS version 9.2.1 (2009) and the model included the fixed effects of variety (Pearl grey, Lavender, Royal purple and White), sex (male and female) and the interaction between the two fixed factors (variety * sex). Results on growth performance of four varieties of guinea fowls are presented as least square means ± standard error. Means separation were by paired t-tests with Scheffe's adjustments to correct for unequal number of birds or

Table 2. Body weights (g) of male and female lavender, pearl grey, royal purple and white varieties of guinea fowls at various ages raised under intensive management system.

Age	Lavender		Pearl grey		Royal purple		White	
(weeks)	Male	Female	Male	Female	Male	Female	Male	Female
4	204.04±12.34	217.43±13.60	205.95±11.10	193.23±14.11	202.43±19.23	207.33±15.34	209.33±29.37	200.80±17.99
6	363.06±17.14	389.14±18.88	418.57±15.92	361.85±19.60	406.57±26.71	383.64±21.30	357.33± 40.79	352.00± 24.98
8	574.82±22.81	609.43±25.13	638.43±20.52	564.69±26.08	628.86±35.54	621.45±28.35	581.83± 54.30	580.00±33.25
10	810.00±25.44	840.29±28.03	875.52±27.22	789.85±29.09	896.86±39.64	879.27±31.62	813.33± 60.55	789.38±37.08
12	1133.18±30.26	1155.86±33.34	1142.00±27.22	1050.46±34.60	1144.29±47.15	1128.36±37.62	1062.00± 72.03	967.00± 44.12
14	1215.29±27.98	1226.79±30.84	1262.29±25.18	1164.92±32.00	1313.14±43.61	1276.36±34.79	1226.67± 66.61	1109.75± 40.79
16	1328.47±30.10	1356.86±33.17	1388.00±27.09	1271.23±34.43	1446.86±46.91	1390.36±37.42	1332.00± 71.66	1167.50± 43.88
18	1412.24±24.80	1475.90±22.32	1475.43±22.32	1389.38±28.36	1533.71±38.65	1471.09±30.83	1420.00± 59.04	1230.50± 36.15

Source: Author

sampling units between varieties and sex. Differences between means were declared significantly different at $P \leq 0.05$. The statistical model used is as specified below:

$$Y_{ijk} = \mu + T_i + S_j + (T_i * S_j) + e_{ijk}$$

Where Y_{ijk} = mean body weight, μ = overall mean, T_i = Effect of the i^{th} variety (pearl grey, lavender, royal purple and white), S_j = Effect of the j^{th} sex (male and female), $(T_i * S_j)$ = interaction between variety and sex of guinea fowl and e_{ijk} = random error associated with ijk^{th} record.

RESULTS AND DISCUSSION

Body weight increased with advancing age in all the four varieties (Table 2) and this is consistent with the results of Fajemilehin (2010) who noted a similar trend in pearl grey, ash (lavender) and black (royal purple) varieties of helmeted guinea fowl in Nigeria. There were no significant sex differences in body weight from 4 to 18 weeks of age in all the varieties. Similar body weights between males and females of the four varieties at all ages indicate the absence of sexual dimorphism for body weight in guinea fowl which normally favors males over females in some poultry species (Peters et al., 2002 and Ilori et al., 2010). Body weights of both males and females of royal purple, pearl grey and lavender varieties of helmeted guinea fowl at 16 weeks of age were higher than those reported by Kozaczynski (1998) at the same age. However, males of pearl grey and white varieties were heavier than their age-matched female counterparts from 4 to 18 weeks of age while lavender females were heavier than their age-matched male counterparts at similar ages. Higher body weight in white guinea fowl males than females from 4 to 18 weeks of age is consistent with Bernacki et al. (2012) who reported higher body weight in white guinea fowl males than females at 14 weeks of age.

Superiority in body weight in royal purple males over their female counterparts started at 6 weeks of age until the end of study at 18 weeks of age. Higher body weights in pearl grey males than females from 4 to 18 weeks of age and in royal purple males than females from 6 to 18 weeks of age are consistent with Kozaczynski (1998). To the contrary, Kasperska et al. (2012) and Mazanowski et al. (1982) reported higher body weight in pearl grey females than males at 13 and 52 weeks of age and at 12 weeks of age, respectively. Compared to the current findings, Kozaczynski (1998) and Bernacki et al. (2012) found higher body weights in lavender males than females from day old to 20 weeks of age and at 14 weeks of age, respectively. In general, the findings on growth performance of different varieties of helmeted guinea fowl up to 18 weeks of age support Nahashon et al. (2006) who found that generally, males appeared to be heavier than females although the differences between the sexes were not significant. Kozaczynski (1998) however found that beyond 20 weeks of age, specifically at 24 weeks of age, females of pearl grey, royal purple and lavender varieties were generally heavier than their male counterparts. Kokoszyński et al. (2011) also reported higher body weights in female than male guinea fowls at 13 and 16 weeks of age.

Growth rate increased every fortnight in both males and females of the four varieties from 4 to 18 weeks of age and the greatest weight gain occurred between 10 and 12 weeks of age in lavender and pearl grey varieties, and between 8 and 10 weeks of age in the royal purple variety irrespective of sex. The greatest weight gain occurred between 10-12 weeks of age in white males and between 8-10 weeks of age in white females. The occurrence of highest weight gains between 8 to 10 weeks of age in royal purple and between 10 to 12 weeks of age in pearl grey and lavender varieties are consistent with Fajemilehin (2010). Both males and females of the four varieties of domesticated helmeted guinea fowl continued to gain weight from 12 to 18 weeks of age but at a much lower rate compared to weight gains from 4 to 12 weeks of age.

Body weights of females and males of different

Table 3. Body weights (g) of females and males of lavender, pearl grey, royal purple and white varieties of guinea fowls at various ages raised under intensive management system.

Age (weeks)	Females				Males			
	Lavender	Pearl grey	Royal purple	White	Lavender	Pearl grey	Royal purple	White
4	217.43±13.60	193.23±14.11	207.27±15.34	200.50±17.99	204.00±12.34	205.95±11.10	202.43±19.23	209.33±29.37
6	389.14±18.88	361.35±19.60	383.64±21.30	352.00±24.98	363.06±17.14	418.57±15.42	406.57±26.71	357.33±40.79
8	609.43±25.13	564.69±26.08	621.45±28.35	580.00±33.25	574.82±22.81	638.43±20.52	628.86±39.64	581.83±54.30
10	840.29±28.03	789.85±29.09	879.27±31.62	789.38±37.08	810.00±25.44	875.52±22.89	896.86±39.64	813.33±60.55
12	1155.86±33.34	1050.46±34.60	1128.36±37.62	967.00±44.12	1133.18±30.26	1142.00±27.22	1144.29±47.15	1062.00±72.03
14	1226.79±30.84	1164.92±32.00	1276.36±34.79	1109.75±40.79	1215.29±27.98	1262.29±25.18	1313.14±43.61	1226.67±66.61
16	1356.86 ^{ab}±33.17	1271.23 ^{ab}±34.43	1390.36 ^{a}±37.42	1167.00 ^{b}±43.88	1328.47±30.10	1388.00±27.09	1446.86±46.91	1332.00±71.66
18	1437.43 ^{a}±27.33	1389.38 ^{ab}±28.36	1471.09 ^{a}±30.83	1230.50 ^{b}±36.15	1412.24±24.80	1475.90±22.32	1533.71±38.65	1420.00±59.04

Means with different superscripts within a particular sex at a particular age are significantly different from each other (P<0.05).
Source: Author

varieties of helmeted domesticated guinea fowls increased with advancing age (Table 3) and this is consistent with Kozaczynski (1998) and Baeza et al. (2001). There were no significant differences in body weight between females of all the four varieties from 4 to 14 weeks of age. However, Royal purple females had significantly higher body weights than their age-matched white counterparts from 16 to 18 weeks of age. Lavender females were also significantly heavier than their white counterparts at 18 weeks of age. Higher body weight in lavender than white females from 4 to 18 weeks of age is consistent with Bernacki et al. (2013) who reported higher body weight in grey than white female guinea fowl at 14 weeks of age. There were no significant differences in body weights between females of lavender, pearl and royal purple and between females of pearl grey and white varieties at all ages from 4 to18 weeks of age. Lavender females had the highest body weights from 4 to 6 weeks of age while the royal purple females had the highest body weights from 8 to 18 weeks of age. The highest body weight in royal purple females than in pearl grey and lavender females at 16 and 18 weeks of age found in the present study is consistent with Kozaczynski (1998) who found similar results at 16 and 20 weeks of age in the same varieties of helmeted guinea fowl. White female guinea fowl had the lowest body weights at all ages from 4 to 18 weeks of age. At 18 weeks of age, royal purple females had the highest body weight followed by lavender, pearl grey and lastly white varieties.

There were no significant differences in body weights between males of all the four varieties at all ages from 4 to 18 weeks of age (Table 3). White males had the highest body weight at 4 weeks of age; pearl grey males had the highest body weights from 6 to 8 weeks of age while royal purple males had the highest body weights from 10 to 18 weeks of age. At 18 weeks of age, royal purple males had the highest body weight, followed by pearl grey, white and lastly lavender males. The highest body weights in both royal purple males and females at 18 weeks of age compared to the other three varieties indicates that the royal purple variety has the greatest potential for selection of meat-type guinea fowl.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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REFERENCES

Baeza E, Juin H, Rebours G, Constantin P, Marche G, Leterrier C (2001). Effect of Genotype, Sex and Rearing Temperature on Carcass and Meat Quality of Guinea Fowl. British Poultry Science 42(4):470-476.

Bernacki Z, Kokoszynski D, Bawej M (2013). Evaluation of Some Meat Traits in Two Guinea Fowl Genotypes. Archiv für Geflügelkunde 77(2):116-122.

Bernacki Z, Bawej M, Kokoszyński D (2012). Carcass Composition and Breast Muscle Microstructure in Guinea

Fowl (*Numida meleagris* L.) of Different Origin. Folia. Biologica. (Kraków) 60(3-4):175-179.
Dahouda M, Toleba SS, Youssao AKI, Mama Ali AA, Dangou-Sapoho RK, Ahounou SH, Hambuckersand A, Hornick JL (2009). The Effects of Raw and Processed *Mucuna pruniens* Seed Based Diet on the Growth Parameters and Meat Characteristics of Benin Local Guinea Fowl (*Numida melagris* L). International Journal of Poultry Science 8(9):882-889.
Fajemilehin SOK (2010). Morphostructural Characteristics of Three Varieties of Greybreasted Helmeted Guinea Fowl in Nigeria. International Journal of Morphology 28(2):557-562.
Ilori BM, Peters SO, Ikeobi CON, Bamgbose AM, Isidahomen CE, Ozoje MO (2010). Comparative Assessment of Growth in Pure and Crossbred Turkeys in a Humid Tropical Environment. International Journal of Poultry Science 9(4):368-375.
Kasperska D, Kokoszynski D, Korytkowska H, Mistrzak M (2012). Effect of age and sex on digestive tract morphometry of guinea fowl (*Numida meleagris* L.). Folia Biologica 60(1-2):45-49.
Kokoszyński D, Bernacki Z, Korytkowska H, Wilkanowska A, Piotrowska K (2011). Effect of Age and Sex on Slaughter Value of Guinea Fowl (*Numida meleagris*). Journal of Central European Agriculture 12(2):255-266.
Kozaczynski KA (1998). Boby Mass Conformation Traits in Four Breeds of Guinea Fowl. Pakistan Journal of Biological Sciences 1:315-317.
Machadeyi FC, Sibanda S, Kusina J, Makuza S (2004). The Village Chicken Production System in Rushinga District of Zimbabwe. Livestock Research for Rural Development 16:6.
Maphosa T, Kusina J, Sibanda NJ, Makuza SM, Sibanda S (2002). Village chicken production in small farming areas in Zimbabwe. Poster Presentation. Poster (J-17), Copenhagen, Denmark.
Mazanowski A, Mazanowska K, Faruga A (2002). Evaluation of the efficiency of several rations of mixed feed for rearing and reproducing guinea-hens. Zesz. Nauk. ART Olsztyn Zootechnika 24:95-105.
Moreki JC, Seabo D (2012). Guinea Fowl Production in Botswana. Journal of World's Poultry Research 2(1):01-04.
Moreki JC, Seabo D, Podi KT, Machete JB (2012). Chemical analysis and sensory evaluation of guinea fowl meat fed diets containing three cereal grains as energy sources up to 12 weeks of age. International Journal of Advanced Science and Technology 2(10):59-66.
Nahashon SN, Aggrey SE, Adefope NA, Amenyenu A (2006). Modelling Growth Characteristics of Meat-Type Guinea Fowl. Poultry Science 85(5):943-946.
Peters SO, Ikeobi CON, Ozoje MO, Adebambo OA (2002). Genetic variations in the performance of the Nigeria local chicken. Tropical Animal Production Investigations 5:37-46.
SAS Institute (2009). User's Guide Version, 9.2.1, 2002-2009. SAS Institute Inc., Cary. NC, USA.