International Journal of Livestock Research, Vol. 11 (5) May' 2021
http://www.ijlr.org
eISSN: 2277-1964

Original Research

Sexual Dimorphism in Dressing Yield and Carcass Traits of Indigenous Guinea Fowl in Humid Tropics

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How to cite this paper: Fadare, A. O. (2021). Sexual dimorphism in the dressing yield and carcass traits of indigenous guinea fowl in humid tropics. *International Journal of Livestock Research*, 11(5), 1-5. https://dx.doi.org/10.5455/ijlr.20210322090806

Received : Mar 22, 2021
Accepted : Apr 27, 2021
Published : May 31, 2021

Abstract

The sexual dimorphism in the dressing yield and carcass traits was evaluated in male and female guinea fowl at the poultry unit of Department of Animal and Environmental Biology, Adekunle Ajasin University, Akungba-Akoko Nigeria. Thirty (30) male and female indigenous guinea fowl were raised under the same management condition for twelve weeks, slaughtered and carcass traits data collected. Results showed that there was no significant difference ($p>0.05$) in the dressing yield of male and female guinea fowl. However, there was sexual dimorphism in thigh weight of guinea fowl. Female had higher thigh weight (99.33±111.09g) than male guinea fowl (89.06 ±12.74g). Female guinea fowl also had higher gizzard weight than their male counterparts. Although male guinea fowl had higher values in slaughter weight, carcass weight and edible carcass compared with female guinea fowl, the relative percentage of the plucked weight to the pre-slaughter weight (live weight) were statistically similar in both male and female. The wing weight (52.89 ± 6.50g) and relative percentage (4.76±0.05%) were higher in male than in female guinea fowl. In conclusion, there was no variation in the dressing yield of male and female guinea fowl, however, sexual dimorphism exists in some internal organs and carcass traits of guinea fowl.

Keywords: Carcass Traits, Dressing Yield, Male and Female Guinea Fowl

Introduction

The contribution of poultry to animal protein supply cannot be over emphasized (Ahmed *et al*., 2018). White meat such as poultry meat is superior to red meat because of its comparatively low-fat content and low cholesterol level (Jaturasitha *et al*., 2008). Next to the indigenous chicken, guinea fowl meat and eggs provide good sources of protein to the rural populace (Obike *et al*., 2011). Guinea fowl is gaining popularity as meat birds in many developing countries due to its delicacy and high nutritional value. In addition to high protein, guinea fowl meat is also characterized by low fat content, (Moreki and Seabo, 2012). Guinea fowl also have ability to protect itself against predators and has better resistance to common poultry parasites and diseases (Kerketta and Mishra, 2016). Other advantages of rearing guinea fowl include low production costs, greater capacity to utilize forage and lower requirements of labour and management.

Guinea fowl meat also has the advantage of a unique taste. Despite its numerous benefits, the production of guinea fowl is still at a rudimentary level (Ebegbulem and Asuquo, 2018). The evaluation and comparison of meat traits of guinea fowl may arouse the interest of potential producers of this avian species (Bernacki *et al*., 2012). There are contradictory reports on the superiority of male and female guinea fowl with regards to their carcass traits. According to Apata *et al.* (2014), sexual dimorphism (differences in male and female) do not exist in the defeathered weight, heart, liver, gizzard, head and leg weight percentage of guinea fowl, however the authors reported that female guinea fowl had higher bled dressing weight percentage and primal cuts than those of male guinea fowl except in the neck which is higher in male. Baeza *et al.* (2001) reported that carcass weight as well as the breast muscle of guinea fowl are affected by sex. This study was therefore carried out to investigate the carcass characteristics of male and female guinea fowl raised in a humid tropical environment.

Materials and Method

Experimental Site

The experiment was carried out at the poultry unit of the Department of Animal and Environmental Biology, Adekunle Ajasin University Akungba-Akoko, Ondo state. Akungba–Akoko is located in Akoko South West Local Government Area of Ondo state, Nigeria. The area lies in the south western region of Nigeria (7º 28' and 5º 43') and has the following environmental condition: ambient temperature of 27^0C and relative humidity of 46mm Hg.

Experimental Animals and Management

Thirty male and female guinea fowl were raised under the same management condition. They were fed with commercial pelleted diet; the diet used contained 17% crude protein, 7% fat, 10% crude fibre, 1.0% calcium, together with available phosphorus of 0.35% and 2550Kcal/kg metabolisable energy. The birds had free access to clean water throughout the period of the experiment and adequate medical attention was given to unhealthy birds.

Slaughtering and Dissection Procedure

At 12 weeks, they were weighed and slaughtered. Each bird was bled and weighed to determine the blood weight. The feathers were plucked and the bird re-weighed. The head was separated and the internal organs were also removed and weighed. Primal carcass parts were also weighed. The inedible parts were also measured with a sensitive scale.

Slaughter Weight: This was the weight after slaughter and bleeding of the birds in grams (g) using a weighing scale.

Plucked carcass: The feathers were removed using hot water. The weight was taken and recorded as the plucked carcass hot weight in gram (g).

Feather weight: This was determined by finding the difference between the slaughter weight and the plucked carcass.

Internal Organs: After the dissection of the birds, the internal organs (gastro intestinal tract, gizzard, heart, and

liver) were weighed in grams (g).

Primal Cut-Out parts: After the dissection of the birds, the head, neck, wings, thighs, legs, breast muscle, and thorax of the birds were measured using a sensitive scale.

Edible carcass: sum of all the edible parts head, heart, liver, leg, thigh, breast muscle, thorax, neck and wing in grams (g).

Dressing yield: ratio of the edible parts to the live weight. It is expressed mathematically as edible carcass/pre-slaughter weight.

Statistical Analysis

Data obtained from the measurements was analysed using SAS 2010. The linear model is as specified below:

$$Y_{ijk} = \mu + A_i + e_{ijk}$$

Y_{ijk} = the parameter or interval
μ = overall mean for the parameter of interest
A_i = Fixed effect of ith sex (j=1-2)
e_{ijk} = random error associated with each record (Normally= Independently and identically distributed with zero mean and variance ($\delta^2 e$)

Results and Discussion

The least square means of the carcass composition presented on Table 1 shows that there was significant difference ($p<0.05$) in the pre -slaughter weight (live weight), slaughter weight, carcass weight and edible carcass of male and female guinea fowl. Male guinea fowl had higher slaughter weight, carcass weight and edible carcass (1140.00 ± 67.83g, 1060.00 ± 69.64g, and 696.51± 29.85g respectively) compared with female guinea fowl (with 1040.00 ±73.14g, 950.00 ± 67.08g and 657.97±71.44g respectively). However, the relative percentage of the plucked weight to the pre-slaughter weight (live weight) of male guinea and female guinea fowl were statistically similar. In the same vein, there was no significant difference in the relative percentage of inedible carcass to the pre-slaughter weight of male and female guinea fowl as shown in Table 1. The dressing yields of male (58.80 ± 3.09%) and female (55.60 ±1.21%) guinea fowl were not statistically different in this study. This is in line with the report of Bernacki *et al.* (2012) that there was no significant difference in the dressing percentage of male and female guinea fowl.

Table 1: Mean and SEM of carcass composition in male and female guinea fowl

Parameters	Female	Male
Pre-slaughter wt (g)	1110.00± 71.41 ^{b}	1260.00 ±73.14 ^{a}
Slaughter weight (g)	1040.00 ± 73.14^{b}	1140.00± 67.82^{a}
% Slaughter weight	93.69 ± 1.08 ^{a}	90.48 ± 0.97 ^{b}
Plucked weights(g)	950.00 ±67.08^{b}	1060.00± 69.64^{a}
% Plucked weight	85.58 ± 2.34	84.13± 1.41
Inedible carcass (g)	364 .03 ± 15.76^{b}	443.5 ±12.64^{a}
% Inedible carcass	33.09 ± 2.14	35.20 ± 1.83
Edible carcass (g)	675.97±71.44^{b}	696.50±29.85^{a}
Dressing yield (%)	55.60 ± 1.21	58.80±3.09

$^{a, b}$ *Mean on the same row with different superscripts are significantly ($P<0.05$) different*

In this study, there was sexual dimorphism in thigh weight of guinea fowl. Female guinea fowl had higher thigh weight (99.33±111.09g) than male guinea fowl (89.06 ±12.74g). The relative percentage of the thigh weight to the pre slaughter weight was also higher in female guinea fowl than male guinea fowl. Although the weight value of breast muscle was higher in favour of male guinea fowls, there was no significant difference in the relative percentage of breast muscle to the pre slaughter weight of female and male guinea fowl as shown on Table 2.

Table 2: Mean and SEM of primal cut-out parts of male and female guinea fowl

Parameters	Female	Male
Thigh (g)	99.33 ± 11.09 [a]	89.06 ±12.74[b]
% Thigh	8.95 ± 0.09[a]	7.07 ± 0.05[b]
Breast muscle(g)	182.53 ± 23.85[b]	209.33 ±8.26[a]
% Breast muscle	16.44 ± 0.76	16.61± 0.84
Wing(g)	52.89 ± 6.50 [b]	68.68 ± 4.20[a]
% Wing	4.76 ± 0.05[b]	5.45 ± 0.04[a]
Neck (g)	42.14± 4.58 [b]	47.73 ±3.89[a]
% Neck	3.80 ± 0.03	3.79 ±0.06
Leg (g)	14.59± 0.92 [b]	16.21 ±1.80[a]
% Leg	1.31 ± 0.02	1.29 ± 0.05
Thorax(g)	162.60 ± 28.53 [b]	172.24 ± 11.46 [a]
% Thorax	14.65 ± 1.23	13.67 ±1.12
Head (g)	52.20 ± 9.23[a]	45.57± 3.62[b]
% Head	4.70 ± 0.07[a]	3.62 ± 0.03[b]

[a, b] Mean on the same row with different superscripts are significantly (P<0.05) different

The wing weight (52.89 ± 6.50g) and relative percentage (4.76 ± 0.05%) were higher in male than in female guinea fowl. Despite that the neck weight, leg weight and thorax weights were higher in favour of male guinea fowl, there were no significant differences in the relative percentages of these primal cuts to the pre slaughter weight among the two sexes. However, Bernacki *et al.* (2012) reported that female guinea fowl had significant greater weight of breast muscle than males. Kokoszynski *et al*. (2011) also observed lower carcass weight, dressing percentage and breast muscle in male guinea fowl compared to their female counterparts. Baeza *et al.* (2001) reported that carcass weight as well as the breast muscle of Guinea fowl are affected by sex. Nwagu and Alawa (1995) reported that female guinea fowl had higher carcass variables than its male counterparts except head and leg which were higher in male.

The variations in the internal organs of male and female guinea fowl are presented on Table 3 showed that the effect of sex was significant ($p<0.05$) on heart as an internal organ. Female guinea fowl had higher heart weight and relative percentages of this organ to the pre-slaughter weight. Female guinea fowl also had higher full and empty gizzard weight than their male counterparts. However, the effect of sex was not significant ($p>0.05$) on liver weight and gastro intestinal weights and their relative percentages. Both male and female guinea fowl had similar liver as well as gastro intestinal tract value (in weights and relative percentages).

Table 3: Mean and SEM of the internal organs of male and female guinea fowl

Parameters	Female	Male
Heart(g)	8.18 ± 1.96[a]	5.92 ± 1. 31[b]
(%)	0.74± 0.02[a]	0.47 ±0.01 [b]
Liver(g)	15.20 ± 0.91	15.40 ± 3.13
(%)	1.37 ± 0.22	1.22 ± 0.14
Empty gizzard (g)	28.28 ± 3.11[a]	26.61 ± 2.77[b]
(%)	2.55 ± 0.04[a]	2.11 ± 0.02
Full gizzard (g)	34.52 ± 2.96[a]	32.78± 4.60[b]
(%)	3.11 ± 0.01[a]	2.60 ± 0.03[b]
GIT (g)	66.49 ± 6.65	67.44 ± 7.17
(%)	5.99 ± 0.11	5.35 ± 0.67

[a, b] Mean on the same row with different superscripts are significantly (P<0.05) different; GIT - Gastro intestinal tract

Conclusion

There was no sexual dimorphism in the dressing yield of male and female guinea fowl. However, female guinea fowl had higher thigh weight than male guinea fowl. Female guinea fowl had higher heart weight and relative percentages of this organ to the pre-slaughter weight compared with male guinea fowl. Female guinea fowl also had

higher full and empty gizzard weight than their male counterparts. The wing weight and relative percentage were higher in male than in female guinea fowl. Although the weight value of breast muscle was higher in favour of male guinea fowls, there was no significant difference in the relative percentage of breast muscle to the pre slaughter weight of female and male guinea fowl.

Conflict of Interests

There was no conflict of interest.

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