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SEXUAL DIMORPHISM ON CARCASS CHARACTERISTICS OF JAPANESE QUAIL (*Coturnix coturnix japonica*) REARED IN DERIVED SAVANNA ZONE OF NIGERIA

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Abstract: This study was conducted to determine the sexual dimorphism on carcass characteristics of Japanese quail (*Coturnix courtnix japanica*). A total of 180 quail chicks were used in the study; comprises 90 males and 90 female birds. The quail were kept on separate floor system and were feed *ad libitum*. Data were obtained on live weight, body weight, Drumstick weight, thigh weight, shank weight, breast weight, back weight and as well as inedible giblets such as heart weight, gizzard weight, liver weight and offal weight on both sexes of the birds. It was determined that there were significant ($P < 0.05$) difference between the carcass component and the sex of the birds. The female quail had higher significant values for live weight (139.43g), body weight (133.93g), thigh weight (11.40g) and shank weight (2.68g) than its counterparts male quail of 128.5g, 122.13g 10.55g and 2.60g for live weight, body weight, thigh weight and shank weight respectively. Meanwhile, the visceral organs were also significantly ($P<0.05$) differed among the sexes of the used quails. Higher values were obtained for female quails in respect of heart weight (1.33g), Gizzard weight (4.68g) liver weigh (5.15g) and offal weight (12.18) than the male quails. Consequently, it was concluded that quail breeding for carcass components both edible and visceral organs were favored for female Japanese quail and meat production female quails were better than the male quails.

Keywords: Japanese quail, sexual dimorphism, edible, visceral organs, derived savanna.

INTRODUCTION

The Japanese quail is used in commercial production for its meat and egg due to qualities such as the short-time generation interval, low feed consumption, high breeding ability, capacity to have a great number of quails per unit area, low breeding costs and high resistance to disease. Egg production is important in far East and Asian countries, whereas meat production is important in Europe (Karapetyan, 2003). Most of the commercial quail breeding companies are small-scale. Usually genetic improvement is not performed for

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breeding flocks used in these companies. However, in the studies carried out to improve the live weight and egg productivity of quail, successful results could be acquired in the short-term.

Any quantitative traits is usually affected by two different set of factors, the first is genetics factors such as genotype and the second is non-genetic factors such as sex, nutrition, climate, adaptability, management and others. In order to establish a breeding programme, it is essential to estimate to carcass parameters for improving the traits. The scale of the genetic parameters could show the amount of improvement by selection.

Some of the estimated genetic parameters for various traits of domestics Japanese quail were reported by several workers (Toelle *et al.*, 1991 and Minvielle *et al*., 2000). Toelle *et al.*, (1991) estimated genetic and phenotypic relationships between body weight, carcass and some of the organ parameters. Minvielle *et al*., (2000) reported the carcass characteristics of a heavy Japanese quail line under introgression with the raux gene. Vali *et al*., (2005) reported carcass weight, carcass percent, breast weight and thigh percentage were affected by sex of the Japanese quail. Due to an increase in quail meat consumption, it is necessary to get familiar with factors that influence the muscles metabolism which reflected in quality said factors and occur before and during sacrifice of the animal as well as in the subsequent processing of the carcass (Gonalez *et al.,* 2007).

The study of growth traits helps in judging the efficiency of management and in deterring the optimum managerial practices to maintain the gain at optimum level because of feed costs decrease with increasing growth rate. Growth can be improved by improving environmental influence such as feed, housing, managerial etc and by choosing the suitable mating system, knowing the sex that can perform well and by improving at genotypic value by selection or by cross breeding (Parks, 1981). However, carcass variables such as body weight and body weight gain affected by genetic and non- genetic factors such as genotype, year and season of production, sex, nutrition and management (Hafez, 1963).

Baker (1983) reported that growth rate and carcass variables are parameters that are often estimated in animal meat production research, with these parameters all kinds of influence may be estimated. There have been many studies investigating and characterizing the carcass of Japanese quail under practical and laboratory conditions (El- Fiky, 1993; Shebi *et al.,* 1996; Aboul Hassan, 1997).

Quail breeding is increasing becoming more widespread since it is possible to achieve yield in much more limited spaces, without substantial investments and within shorter periods of

time when compared to other types of poultry breeding since quails are much more resistant to environment factors (Nagarajan *et al.,* 1991). In order to attain success in quail breeding, as in all other livestock breeding environmental condition should be maintained at an optimum level. Therefore, the aim of the present study was to determine sexual dimorphism on carcass characteristics of Japanese quail kept in derived savanna area of Nigeria.

MATERIALS AND METHODS

Experimental site

The research was carried out at the Poultry unit of Teaching and Research Farm Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.. Ogbomoso is a derived savanna zone of Nigeria that that lies within the latitude 8^0 15^1 North and longitude 4 ^{0} 15^1 East. The area has an annual rainfall of 1247mm with altitude between 300 – 600 meter above the sea level while the mean annual temperature is about 27^0 C (Amao *et al*., 2011).

Birds and Husbandry

A total number of 200 Japanese quail *(Coturnixc coturnix japonica*) were procured in the reputable farm. Quail used for the study were kept under normal brooding condition in brooding floor pen until they were 3 weeks of age under continuous light and with gradual decrease in room temperature from 37^0C at brooding to 25^0C at six weeks of age. At three weeks of age, 180 birds were individually weighed and randomly divided into two sex experimental group according to the aim of the experiment. The first group was males while the second group was female. All the birds were kept under similar condition during experimental period. The birds were fed a ration containing 28% crude protein and 2800kcalME/kg at age 0-4 weeks, 24%Cp and 2800calME/kg at 4-8 weeks and 18%CP, 2700kcalME/kg at 9 weeks till the end of experiment.

Collection of Data

Weekly weight gains were recorded as the live weight gains. At the end of the experiment (10 weeks), 160 birds (80 birds per sex) were randomly selected from the population. The birds were fasted overnight but water was made available. These birds were slaughtered by cervical dislocation, defeathered after scalding. The body parts and organs were cut and weighed as a criterion for the assessment of carcass characteristics. The weight of the breast, thighs, drumstick, back, neck, head, wing and the visceral organs (Liver, gizzard, lung, spleen and proventriculus) were expressed as gramme of starved live weights.

Statistical Analysis

The data obtained were subjected to general linear model of SAS (2003) software. Student's

test was used for the separation of the means.

The below model was adopted:

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

Where:

Y_{ij} = Observation

μ = population mean

S_i = Fixed effect of sex i^{th} (1, 2)

e_{ij} = Residual error.

RESULTS

Table 1 shows the least square means of sex on the edible parts of Japanese quail. There were significant ($P<0.05$) differences between the sex of the birds and the edible carcass composition. Live weight was higher in female birds than the male birds (129.43g vs 128.50g). Body weights after slaughtered were higher for female birds than its counterparts male birds (133.93g vs 122.13g). However, the thigh weight and shank weight were higher for female birds than the male birds of (11.40g vs 10.55g) and (2.68g vs 2.60g) respectively.

Least square means of sex on visceral organs of Japanese quail is presented in table 2. There were significant ($P<0.05$) differences between the sex and the inedible giblets measured. Heart weight was higher for female birds than the male birds (1.33g vs 1.00g). The female birds had higher value of gizzard weight (4.68g) than the male birds (3.53g). Liver weight values were also higher for female birds than its male counterpart (5.15g vs 3.48g). The female birds had higher offal value (12.18g) than the male birds (10.83g).

DISCUSSION

The results obtained for edible parts sex wisely indicate that the female birds were favoured for the live weight were in agreements with the report of Seker *et al.*, (2007). These authors obtained higher values of effect of slaughter age on fattening performance and carcass characteristics of Japanese quails that favoured the female birds. Likewise, the present estimates for body weight, that favoured females than the males as been reported by Singh *et al*., (1981); Seker *et al*., (2007). These authors believe that the higher average body weight values obtained could be attributed to the fact that the researchers used exclusively female quails in their study.

Similar, results have been reported in other studies as well as thigh and shank weights in the present estimated values that were in agreement with the (Ayansan *et al.,*2000; Okan and

Uloocak, 1992). It is believed female birds were under the influence of genetic characters that made it higher in all variables than its counterpart male birds. Meanwhile, the estimates values for carcass variables that found females to had heavier body weight, live weight, thigh weight and shank weight had been observed by Aboul-Hassan (2000). This divergence in carcass composition between the two sexes may be attributed to an acceleration of weight gain by females just prior to laying their first egg. However, Caron *et al.,* (1990) indicated that females grow faster and yield larger muscles and more abdominal fat than male at the same age. In addition, the growth and development of the two sexes at early ages and the functions of hormonal and regulatory systems are fastly different in most species of animals (Vasilatos- younken e*t al.,* 198l).

Meanwhile, the carcass of female birds was produced higher meat and giblet percentage than those produced from carcass of males in this present study were in the same trend with observation of Mousa (1993) who reported that female carcasses were higher in meat and giblet percentage than the male carcasses and lower in bone percentage. Mohammed (1990) reported similar trend in case of giblet percentage than the male carcass where the female had higher percentage of giblets than males. On the contrarily, Ibrahim *et al.,* (2009); Seker, *et al*., (2007) and Sengul *et al.,* (2000) reported statistically insignificant results for slaughter weight, Hot carcass weight, hot carcass yield, heart weight, liver weight and giblets weight respectively. Kul *et al.,* (2006), on the other hand, found for the Japanese quails, a significant difference for carcass and the giblets variables respectively. A comparison of the findings of the present study and those of other researchers reveals that there are differences between carcasses and giblets variables on sex. It is believed that the discrepancy in the results of present study and those of cited study is mainly due to differences in sex of the birds.

CONCLUSION

It was determined that sexual dimorphism of Japanese quail on carcass composition in significant during the study period, the higher live weight, bodyweight, thigh weight, shank weight and as well as giblets parameters favoured female birds than its counterpart males birds. This it was concluded that female quail were better in carcass characteristic when compared to those of males components. Although, the meat components of quail birds were smaller while compared with other poultry birds like chicken and Turkey but while embarking on assessment of carcass characteristics by the farmers; the female carcass components will be recommended.

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Table 1: Least square means of sex on the edible parts of Japanese quail

Variables	Obs	Sex	
		Male	**Female**
LW (g)	160	128.50 ±8.35[b]	139.43±9.44[a]
BW(g)	160	122.13±10.22[b]	133.93±10.58[a]
DS (g)	160	7.98±0.35	7.85±0.47
Thigh (g)	160	10.55±1.45[b]	11.40±0.85[a]
Shank (g)	160	2.60±0.20[b]	2.68±0.01[a]
Breast	160	29.60±2.35	30.43±0.47
Back	160	19.08±036	18.96±0.48

[ab] Means in the same row with different superscripts are significantly (P<0.05) differ

LW (g) = Liver Weight, BW (g)= body weight, DS (g) = Drumstick, Obs= Number of Observation

Table 2: Least square means of sex on visceral organs of Japanese quail

Variables	Obs	Sex	
		Male	**Female**
Heart	160	1.00±0.01[b]	1.33±0.02[a]
Gizzard	160	3.53±0.03[b]	4.68±0.01[a]
Liver	160	3.48±0.03[b]	5.15[a]±0.03[a]
Offal	160	10.83±0.03[b]	12.18±0.85[a]

[ab] Means in the same row with different superscripts are significantly (P<0.05) differ.
Obs= Number of Observation