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# Organ weight: As Influenced by color, sex and weight group in Japanese quail

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ABSTRACT

This study was carried out on Japanese quails *(Coturnix japonica)* to determine the effect of sex, colour and weight group on various organ weights. The birds were housed in deep litter pen at the poultry unit of University of Maiduguri Teaching and Research Farm. Birds were fed with broiler starter marsh from 5-8 weeks then, layer mash from 8-52 weeks. The birds were divided into various groups (sex, colour and weight groups). The experiment lasted for 52 weeks. Birds were slaughtered and eviscerated. The organs were weighed using sensitive scale and the results obtained were subjected to statistical analysis using Analysis of Variance (SPSS 16.0 statistical package) and the means were separated using Duncan Multiple Range Test. Effect of color on organ weight were statistically not significant ($p>0.05$) except for fat weight, while the effect of sex on organ weight indicated that male and female differed significantly ($p<0.05$) for all organ weights except liver weight. Similarly, weight group had significant effect ($p<0.05$) on all the carcass traits except liver and testicular weight. The information obtaained in this study could serve as an immense advantage to farmers in the selection of desirable traits in Japanese quail. This will also enhance the farmers to maximise their profits.



## 1. Introduction

Japanese quail is the smallest avian species farm for eggs and meat production (Minvielle, 1998) and it has assumed worldwide importance as laboratory animal, the advantages of Japanese quail which has been widely used for biological and genetic studies ( Narayan *et al.,*1998) because it has small body size and it is easily handled and large number of bird can be kept in a limited space. Depending on day length some female start laying at 35 days of age (average 40 days) and are in full production by 50 days of age and have a short generation interval such as its ability to produce 3 to 4 generations per year, make it an interesting laboratory animal. Because of this, they are an economic animal model for research.

It has been known that fattening performance and carcass characteristics of quails are affected by the length of growth period, genotype, selection, nutritional content of the ration used, especially during the growth period. Some researchers reported that body weight and hatching egg weight are correlated (Adedokun and Sonaiya, 2002) and by selection the body weight could be increasing (Sahin *et al.,* 2007). The results from previous studies from researchers indicated that, selection for live-weight also increased carcass weight (Caron *et al*., 1990; Marks, 1990; Oguz & Turkmut, 1999; Oguz, 2005). Some of the estimated genetic parameters for various traits of domestics Japanese quail were reported by several researchers. Toelle *et al.,* (1991), estimated genetic and phenotypic relationships between body weight, carcass and some of the organ parameters. Minvielle *et al.,* (1999), reported the carcass characteristics of a heavy Japanese quail line under introgression with the roux gene. He also reported roux plumage was significantly associated with 3% lower body weight and 30% less abdominal fat pad. Many factors affect carcass characteristics, including age, sex, line and brooding temperature (Moran, 1977). This study is thus focussed on understanding the basis for breeding selection in Japanese quail.

## 2. Materials and methods

The experiment was conducted at the university of Maiduguri livestock Teaching and Research Farm, Borno State in the North Eastern part of the country. 120 birds' Japanese quails (male and female) were obtained from the National Veterinary Institute (NVRI), VOM, Plateau State. They were housed in deep litter pens equipped with feeding and watering troughs. The floor was covered with wood shaving. The birds were first fed broiler starter ration containing 24% CP, l32ME kcal/Kg metabolizable energy, which was later change to layers marsh. Weekly weighing was conducted to obtain weights at different age. At 52 days of age and, total 84 quails (42 male and 42 female) were selected based on weight (heavy, medium and light), color and sex groups into various groups and starved for 12 h, but water given *ad libitum*. All quails were weighed individually with a digital balance with before slaughter. Quails were killed by cutting the jugular vein. Following a 4 min bleeding time, each quail was dipped in a water bath at 60°C for 3 min. Bled weight was obtained immediately after slaughtering, while carcass weight was recorded after evisceration and defeathering using a sensitive scale balance. The visceral were separated into major parts viz; gizzard, proventriculus, liver, heart. This procedure was done for all the groups as listed in the table

### 2.1. Statistical analysis

All data collected subjected to Analysis of Variance using GLM sub routine of SPSS 16.0 statistical package and the means separated using Duncan Multiple Range Test.

## 3. Results and discussion

### 3.1. Effect of colour and sex on organ weight

Least square means± standard error on the effect of color on organ weight was presented in table1. There was no significant difference ($p>0.05$) in all the parameters except for fat weight that differs significantly ($p<0.05$) with values 1.25g and 5.04g for normal color and albino respectively. This is in contrast with the work of Caron *et al.,* (1990), who observed that there were no reports on the associated effect of plumage color and mutation on adiposity in Japanese quail.

Similarly, effect of sex on organ weight as shown in table indicate that male and female differ significantly ($p<0.05$) for all organ weight except liver weight which shows no significant effect ($p>0.05$) between male and female. The value of fat weight for male and female are 3.82g and 2.46g, gizzard weight 4.14g and 4.47g, heart weight 0.92g and 0.97g, liver weight 2.41g and 3.72g, provetriculus weight 0.53g and 0.65g respectively. This

agrees with the work of Selim *et al.,* (2006), who reported higher weight of heart, liver and giblet in female than those in male. However, this difference was only significant for the liver weight ($p<0.05$). Heavier internal organs of female birds resulted in an increased slaughter weight and hot carcass weight. Ozcelik *et al.,* (1998) and Ayasan et al., (2000) reported similar findings.

### 3.2. Effect of weight group on organ weight

Also, from the result obtained, it was observed that weight group had significant effect ($p<0.05$) on all the carcass traits except liver weight and testes weight which showed no variation among the three weight groups. The heavy group had the highest mean value for all the organs weight which differs significantly from the medium and light groups. The values of weight for heavy, medium and light weight groups are 4.69g, 2.59g and 2.14g respectively. Similarly, gizzard weight had the values 4.60g, 4.33g and 3.99g for heavy, medium and light weight groups. The values of heart weight are 1.11g, 0.87g and 0.84g. That of liver weights were 3.19g, 2.96g and 3.06g for heavy, medium and light weight groups and values for testicular weight are 2.51g, 2.33g and 2.34g respectively.

Estimates of genetic parameters for slaughter and carcass traits of quails were reported by Kawahara & Saito (1976), Toelle *et al*. (1991), Aksit *et al*., (2003) and Vali *et al*., (2005). Heritability estimates for eviscerated weight, and carcass, carcass fragments and abdominal fat weights were generally found to be high and medium in the reported studies. Additionally, there is high genetic correlation between abdominal fat and carcass yield in poultry (Gaya *et al*., 2006). The finding that a higher live-slaughter weight and carcass weight in females compared to male quails has been supported by many studies (Ayasan et al., 2000). However, in this study the effects of sex, colour and weight group on organ weights in Japanese quail were the parameters studied.

**Table 1**
Effect of colour, sex and weight group on organ weight of Japanese quail.

| | Fat weight (g) | Gizzard weight (g) | Heart weight (g) | Liver weight (g) | Proventriculus weight (g) | Testes weight (g) |
|---|---|---|---|---|---|---|
| **Color** | | | | | | |
| Normal (n=12) | 1.25±0.31$^{b}$ | 4.44±0.06$^{a}$ | 0.96±0.01$^{a}$ | 3.16±0.06$^{a}$ | 0.62±0.01$^{a}$ | 2.56±0.07$^{a}$ |
| Albino (n=12) | 5.04±081$^{a}$ | 4.17±0.15$^{a}$ | 0.93±0.03$^{a}$ | 2.97±0.16$^{a}$ | 0.56±0.03$^{a}$ | 2.23±0.15$^{a}$ |
| **Sex** | | | | | | |
| Male (n=12) | 3.82±0.51$^{a}$ | 4.14±0.09$^{b}$ | 0.97±0.02$^{a}$ | 2.14±0.10$^{b}$ | 0.53±0.02$^{b}$ | |
| Female (n=12) | 2.46±0.52$^{b}$ | 4.47±0.09$^{a}$ | 0.92±0.02$^{a}$ | 3.72±0.10$^{b}$ | 0.65±0.02$^{a}$ | |
| **Weight group** | | | | | | |
| Light (n=12) | 2.14±0.66$^{b}$ | 3.99±0.12$^{c}$ | 0.84±0.03$^{b}$ | 3.06±0.14$^{a}$ | 0.54±0.02$^{b}$ | 2.34±0.12$^{a}$ |
| Medium (n=12) | 2.59±0.58$^{b}$ | 4.33±0.11$^{b}$ | 0.87±0.03$^{b}$ | 2.96±0.11$^{a}$ | 0.60±0.02$^{a}$ | 2.33±0.13$^{a}$ |
| Heavy (n=12) | 4.69±0.54$^{a}$ | 4.60±0.10$^{a}$ | 1.11±0.02$^{a}$ | 3.19±0.11$^{a}$ | 0.63±0.01$^{a}$ | 2.51±0.10$^{a}$ |

$^{a, b, c}$Means within columns with different superscript are significantly ($P<0.05$) different from other.

## 4. Conclusion

Japanese quail, despite their small body size, have an important place in commercial production because of their high egg and meat production capacity. In addition, many producers want to obtain heavier quails since small quails are not preferred by consumers, which extend the rearing period. However, it has been confirmed that most of the weight increases are due to abdominal fat deposition when the optimal slaughtering age of the Japanese quail is exceeded (Toelle *et al*., 1991). This situation causes significant economic losses to producers and results in lesser quality products for consumers. However, it is possible to attain positive results in a short period of time by

applying suitable breeding strategies to increase carcass weight and quality. Reaching sexual maturity, fattening occurs more rapidly and extensively in females due to female hormones resulting in a higher weight compared to the male quails. Conclusively, successful breeding study, genetic parameters of the selected traits should be correctly estimated and suitable breeding programmes is planned.

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