The effects of plumage color lines and sex on slaughter weight and carcass parts of Japanese quail

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Abstract. This study was conducted to evaluate the effects of plumage color lines and sex on slaughter weight and carcass parts of Japanese quail. A total of 80 birds consisting 40 Brown (20 males and 20 females) and 40 Black lines (20 males and 20 females) have been raised under the same condition and they were grouped into four groups, Brown 1 line (B1), Brown 2 line (B2), Black 1 line (L1), and Black 2 line (L2), respectively. After 14 weeks of age, they were slaughtered. Slaughter weight, carcass weight, thighs, drumsticks, wings, breasts, and back were calculated. Furthermore, the data were analyzed using the general linear model (GLM) and the differences among lines have been tested using Duncan’s multiple range test (DMRT) with 5% of the alpha level. The results found that slaughter weight, thighs, and back were significantly different among quail lines (P<0.05). Slaughter weight was lowest in B1 line and highest in L1 line (135.67 vs 149.85 g). The highest thigh percentage was found in B1 line population while L1 line was the lowest thigh percentage (14.29 vs 13.46%). The B2 line has the highest back part percentage. In addition, sex was significantly affecting carcass parts of Japanese quail (P<0.05). Female quail has more breast, drumstick, and wing parts compared to male quail. On the other hand, male quail has higher thigh percentage than female quail. This study concluded that plumage color affecting slaughter weight, thigh and back of Japanese quail carcass and female quail produced more breast, drumstick, and wings parts of quail carcass.

1. Introduction

In Indonesia, Coturnix coturnix japonica, which is well known as Japanese quail, is quail species mostly raised by farmers. It is the most popular quail to be farmed for producing eggs and meats [1]. It has two lines based on its plumage colors, i.e. black and brown plumage lines, respectively. Besides producing the egg, Japanese quail is also raised to produce meat. Quail carcass can be derived from male quail or female quail that already had low egg production due to economically inefficient to be kept.

Carcass quality may be affected by various factors such as slaughter age and genetics [2]. Indicators determining carcass quality is meat and skin colors, and also thickness of meat fibers. In addition, factors such as sex, strain, body size, age of slaughter, and inheritance factor may affect carcass quality of quail [3, 4]. Previous study reported that different plumage color line significantly affected body weight, heart weight, and fatness of quail. Black plumage quail line has higher body weight than Brown plumage quail line [3]. Therefore, this study was carried out to evaluate the effects of plumage color lines and sex on slaughter weight and carcass parts of Japanese quail.

2. Materials and Methods

2.1. Quail population

The population used in this study was 80 parents stock quail consists of 20 Brown male and 20 Brown female quails and also 20 Black male and 20 Black female quails. They were fed with commercial broiler starter diet started from 0 to 30 days of age. After that, they were fed by using commercial laying quail feed until 14 weeks of age.

2.2. Slaughtering and carcass processing
Quails were fasted for 4 hours before they were slaughtered. Furthermore, they were dipped into warm water at 50 to 55°C [5]. Then, feather was removed and evisceration was also conducted to remove internal organs. The head, neck, shank were cut [6]. The wings were separated by the shoulder joint and cut circularly. The thigh was separated from the acetabulum with pelvic muscles and without pelvic bones. The intact back separated from the pelvic bone, scapula part vertebrae from the posterior neck to tail [5].

The data collected in this study were slaughter weight, carcass weight, carcass percentage, breast, thighs, drumstick, back, and wings. Slaughter weight and carcass weight are obtained by weighing using a digital scale with the capacity of 500 g and sensitivity of 0.01. Carcass percentage and proportion of carcass parts are measured by using these following formulas:

\[
\text{Carcass Percentage} = \frac{\text{Carcass Weight (g)}}{\text{Slaughter Weight (g)}} \times 100\%
\]

\[
\text{Carcass Parts Percentage} = \frac{\text{Carcass Parts Weight (g)}}{\text{Carcass Weight (g)}} \times 100\%
\]

2.3. Experimental design and analysis of data
This present study was using completely randomized design (CRD) and general linear model (GLM) had been applied to evaluate significant effect of plumage color line and sex of quail to carcass traits. If there was a significant effect then it would be continued with Duncan's multiple range test (DMRT) with 5% of alpha.

3. Results and Discussion
3.1. The effect of plumage color line to slaughter weight and carcass proportions
Statistical analysis showed that slaughter weight, thigh, and back were significantly different among plumage color lines (Table 1). Slaughter weight of Black line was much higher than Brown line, 149.85 vs 135.67 g (P<0.05). Previous study reported that difference of slaughter weight might be caused by different genetic potency among quail lines [7]. Selection and age of slaughter were also affected slaughter weight of quail [8]. Moreover, higher back proportion of Black plumage line was found in this study (Table 1). On the other hand, thigh proportion was significantly higher in Brown plumage line than Black one, 14.29 vs 13.46%. This result was much lower than previous study that reported thigh percentage were ranged from 16.03 to 22.21% [3, 9]. In addition, no significance effect of plumage color line to carcass weight, breast, drumsticks, and wings were observed in this current study. This result was different with previous study reported that drumstick weight, carcass weight, the percentage of carcass, breast, and thigh weight were significantly different among strains [10, 11].

| Table 1. Carcass Weights Based on Black and Brown Plumage |
|----------------------------------|--------|--------|---------|--------|----------|
| Variable                        | B1     | B2     | L1      | L2     | P-Value  |
| Slaughter weight (g)            | 135.67b| 140.12ab| 149.85a | 145.99ab| <0.05    |
| Carcass (g)                     | 86.33  | 88.65  | 93.30   | 87.97  | 0.18     |
| Breast (%)                      | 39.93  | 38.70  | 40.08   | 39.05  | 0.35     |
| Thigh (%)                       | 14.29a | 13.65ab| 13.46b  | 14.14a | <0.05    |
| Drumstick (%)                   | 10.70  | 10.44  | 10.23   | 9.83   | 0.09     |
| Backs (%)                       | 26.16c | 28.51a | 27.87b  | 28.43c | 0.05     |
| Wing (%)                        | 8.88   | 8.53   | 8.24    | 8.47   | 0.32     |

L1 is Black 1 line; B1 is Brown 1 line; L2 is Black 2 line, B2 is Brown 2 line.

\(^{ab}\) Different superscript on the same row shows a significant difference among lines (P<0.05).
3.2. The effect of sex on slaughter weight and proportions of carcass part

The effects of sex on slaughter weight and carcass parts are presented in Table 2. The statistical analysis showed that breast, thigh, drumstick, and wings were significantly different between sex (P<0.05). Breast, drumsticks, and wings of female quail were higher than male quail, on the other hand, male quail had higher thigh percentage than female.

| Variable   | Male      | Female    | P-Value |
|------------|-----------|-----------|---------|
| Slaughter weight (g) | 135.01    | 150.88    | 0.83    |
| Carcass (g)    | 92.83     | 85.55     | 0.54    |
| Breast (%)     | 38.64b    | 40.07a    | <0.05   |
| Thigh (%)      | 14.30a    | 13.54b    | <0.05   |
| Drumstick (%)  | 10.09b    | 10.75a    | <0.05   |
| Backs (%)      | 28.88     | 26.77     | 0.21    |
| Wings (%)      | 7.98b     | 8.81a     | <0.05   |

*ab Different superscript on the same row shows a significant difference between sex (P<0.05).

The percentage of female breasts was higher than males. It may be caused by the slaughter weight in females is higher than males so that the percentage of breasts can also be higher. The percentage of breasts in this study was higher than previous study [3]. The percentage of female drumstick and wings were found higher than male that similar to previous report [11, 12, 13]. However, thigh percentage in male sex was 1% higher than female (Table 2). Previously, it is known that thigh length of male quail is higher than female which is affecting the proportion of thigh [14].

Additionally, slaughter and carcass weights and back part were not different between sex in this study. This results were different with previous studies that reported male quail had higher backs [13], on the other hand slaughter weight were higher in female quail population due to heavier female internal organ weights than males [8, 11, 12, 15] impacting to higher carcass weight in female [16].

4. Conclusions

This study concluded that Black plumage line had higher slaughter weight and backs. Brown plumage color had higher thigh percentage. In addition, female quail had higher breast, drumstick, and wing percentages. Male quail had higher thigh percentage than female quail.

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