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# Farklı Hatlardaki Japon Bıldırcınlarında (*Coturnix coturnix japonica*) Farklı Kesim Yaşı ve Cinsiyetin Karkas Özelliklerine Etkisi*

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**Özet:** Bu çalışmanın amacı Japon bıldırcınlarında cinsiyet ve kesim yaşının (*Coturnix coturnix japonica*) canlı ağırlık ve bazı karkas özelliklerine etkilerini belirlemektir. Araştırmada materyal olarak 5. hafta canlı ağırlığına göre 11 generasyon yüksek canlı ağırlık yönünde seleksiyon uygulanmış Japon bıldırcın hattı kullanılmıştır. Yaşın, canlı ağırlık, karkas ağırlığı ve karkas randımanı üzerine etkisi önemli bulunmuştur. 5 haftalık yaştaki canlı ağırlıklar diğer haftalara göre daha düşük bulunmuştur (P<0,01). Ayrıca cinsiyetin canlı ağırlık ve karkas ağırlığına etkisi önemli bulunmuş olup dişilerin erkeklerden daha yüksek canlı ağırlık ve karkas ağırlığına, buna karşılık erkeklerin ise daha yüksek karkas randımanına sahip oldukları saptanmıştır. (P<0,01). Kanat yüzdesi dışında, but, boyun ve sırt yüzdesi bakımından cinsiyetler arasında önemli farklılıklar saptanmamıştır. Bunun yanında cinsiyetin ciğer ve taşlık yüzdelerine etkisi önemli bulunmuştur (P<0,01). Sonuçlar, kesim yaşının but ve kanat yüzdeleri hariç, karkas parçaları ile iç organların yüzdelerini önemli derecede etkilediğini göstermiştir.

**Anahtar kelimeler:** Karkas özellikleri, Japon bıldırcını, cinsiyet, kesim yaşı

# The Effects of Different Slaughter Ages and Sex on Carcass Characteristics in Japanese Quails of Different Lines (*Coturnix coturnix japonica)*

**Abstract:** The aim of this study was to determine the effects of sex and slaughter ages on body weight and some carcass traits in Japanese quails (*Coturnix coturnix japonica*). The material used in this research was selected for 11 generations from high (HL) body weight Japanese quail line according to 5-week body weights. Age had a significant effect on body weight, carcass weight and carcass yield. Body weight was lower for the quails slaughtered at 5 weeks of age than for all the other ages examined (P<0,01). Also, sex effect was significant on body weight and carcass weight being higher for females than for males at all ages, but males showed higher carcass yield than females (P<0,01). Except wing percent, there was no significant difference between the sexes in terms of thigh percent, neck percent and back percent. Sex had also significant effect on liver and gizzard percent (P<0,01). Furthermore, results showed that slaughter age affected percents of some internal organs and carcass parts of quails except thigh and wing percents, significantly.

**Key words:** Carcass traits, Japanese quail, sex, slaughter ages

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## Introduction

The Japanese quail is the smallest avian species farmed for egg and meat production (Baumgartner, 1994; Minvielle, 1998) and it has also assumed world-wide importance as a laboratory animal. The advantages of Japanese quail, which have been widely used for biological and genetic studies (Tsudzuki, 1994; Narayan et al., 1998) because it has a small body size, it is easily handled, and the large number of birds can be kept in a limited space. Depending on the day length, some females start to lay at 35 days of age (average 40 days) and having a short generation interval such as ability to produce 3 to 4 generations per year.

It has been known that fattening performance and carcass characteristics of quails are affected by the length of growth period, genotype, sex, age, selection, nutritional content of the ration used, especially during the growth period (Moran, 1977). Some researchers reported that body weight and hatching egg weight are highly correlated (Adedokin and Sonaiya, 2002; Ozcelik and Ozbey, 2004) and the body weight could be increased by selection (Shahin et al., 2000; Brah et al., 2001; Alkan et al., 2008). In addition, gender of quails also plays a role on fattening performance and body weight of quail. Shrivastava et al. (1995) reported that the birds grown as separate had higher body weight at 5 weeks of age compared to those grown as mixed. At 6 weeks of age, the birds with the highest live body weight were males in the mixed-grown group. Du Preez and Sales (1997) reported that female quails reached maximum growth point more delayed than male birds did. Cerit and Altinel (1998) reported that average live body weight at the end of 6 week period was 159,01 g in males, 179,79 g in females (average 169,25 g). Ozcelik et al. (1998) reported slaughter weight, hot carcass weight, hot carcass yield of 5 week old quails as 111,55 g, 73,22 g and 65,37 % for females, and 111,38 g, 73,29 g and 65,64% for males, respectively. Ayasan et al. (2000) reported that males gain higher body weight while females had higher carcass weight. Kirmizibayrak and Altinel (2001) found that at the end of 6 week period, slaughter weight as 168,59 g for males, 213,99 g for females, carcass weight and carcass yield as 122,11 g and 72,55% for male and 136,46 g and 64,10% for female birds.

The experiment was conducted to evaluate the effects of different slaughter ages and sex on carcass characteristics in Japanese quails (*Coturnix coturnix japonica*).

## Material and Methods

The material used in this research was selected for 11 generations from high (HL) body weight Japanese quail line according to 5-week body weights bred at the Akdeniz University, in Turkey. The line was established by applying individual selection with 10% and 40% selection intensity for males and females, respectively. Mating was random to minimize inbreeding.

The obtained eggs from 11 generations selected line were individually weighed and incubated. Hatched quail chicks were wing-banded and individually weighed. Chicks were housed in controlled temperature battery brooders at a density of 130 $cm^2$/quail. The temperature was 34 ºC in the first week of age and was reduced by 2 ºC/week until the birds were 4 weeks old, and then supplemental heating was disconnected. Quails were fed with a diet containing 11,9 MJ/kg metabolizable energy and 240 g crude protein/kg as *ad libitium*, while unlimited water was supplied until the end of the experiment. The lighting regime was 23 L:1 D. Totally 20 quails (10 males and 10 females) were selected randomly for carcass examination at each age, and starved for 12 hours, but with water availability. All quails were weighed individually with a digital balance with accuracy 0,1 g before slaughter. Quails were slaughtered at 5, 6, 7 and 8 weeks of age.

Quails were killed by cutting the jugular vein. Following a 4 min bleeding time, each quail was dipped in a water bath at 55 ºC for 2 min, and defeathered mechanically. Carcasses were eviscerated manually. Wings were removed by cutting through the

shoulder joint at the proximal end of the humerus. The whole breast portion was obtained by cutting through the ribs, thereby separating the breast portion from the back. In order to reduce variation in the cutting procedure, all dissections were carried out by one operator (Yalcin et al., 1995).

Data were subjected to analysis of variance using the General Linear Model Procedure of SPSS (Anonymous, 2001) and significant differences among the means were tested by Duncan's Multiple Range Test. The Pearson's correlations were calculated among the traits. Following model was used for determination of the effect of age and sex on body weight, carcass weight, carcass yield and carcass parts of quails.

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

$Y_{ijk}$: represents the body weight, carcass weight, carcass yield or % of carcass parts

$A_i$: effect of the $i^{th}$ age at slaughter (week)

$S_j$: effect of the $j^{th}$ sex

$e_{ijk}$: error term, ~N $(0, \sigma_e^2)$

## Results

The effects of age and sex on body weight, carcass weight, carcass yield, carcass parts percents, and Pearson's correlation coefficients were presented in Table 1, 2, 3 and 4.

Table 1. The effects of age and sex on body weight, carcass weight, carcass yield and breast percent
(± SD)

*Çizelge 1. Yaşın ve cinsiyetin canlı ağırlık, karkas ağırlığı, karkas randımanı ve göğüs oranına etkileri*

| Sex<br>*Cinsiyet* | Body weight (g)<br>*Canlı ağırlık* | Carcass weight (g)<br>*Karkas ağırlığı* | Carcass yield (%)<br>*Karkas randımanı* | Breast (%)<br>*Göğüs* |
|---|---|---|---|---|
| Female<br>*Dişi* | 262±44,0 Y | 167±25,4 Y | 64,1±4,62 X | 37,9±2,62 y |
| Male<br>*Erkek* | 217±25,6 X | 155±20,4 X | 71,3±2,53 Y | 36,8±1,99 x |
| Week<br>*Hafta* | | | | |
| 5 | 208±20,0 A | 144±13,6 A | 69,2±1,61 b | 38,8±1,61 b |
| 6 | 234±35,9 B | 158±20,7 AB | 67,8±3,62 ab | 37,1±2,11 a |
| 7 | 243±26,3 B | 162±14,2 B | 66,9±6,56 a | 36,6±2,08 a |
| 8 | 274±52,3 C | 181±28,1 C | 66,9±7,01 a | 36,9±3,00 a |

A, B, C: means of slaughter ages with no common superscript differ significantly (P<0,01)
a, b: means of slaughter ages with no common superscript differ significantly (P<0,05)
X, Y: means of sexes with no common superscript differ significantly (P<0,01)
x,y: means of sexes with no common superscript differ significantly (P<0,05)

Table 2. The effects of age and sex on ratios of some carcass parts, % of body weight (± SD)
*Çizelge 2. Yaşın ve cinsiyetin canlı ağırlığın yüzdesi olarak bazı karkas parçalarına etkileri*

| Sex<br>*Cinsiyet* | Thigh (%)<br>*But* | Wing (%)<br>*Kanat* | Neck (%)<br>*Boyun* | Back (%)<br>*Sırt* |
|---|---|---|---|---|
| Female<br>*Dişi* | 22,7±1,57 | 8,89±1,03 y | 7,88±1,38 | 23,1±2,51 |
| Male<br>*Erkek* | 23,0±0,813 | 8,38±0,916 x | 8,12±1,13 | 23,2±1,57 |
| Week<br>*Hafta* | | | | |
| 5 | 22,4±0,975 | 8,40±1,13 | 7,31±0,785 A | 21,6±2,05 A |
| 6 | 22,9±0,877 | 8,93±0,782 | 7,67±1,01 AB | 23,3±1,09 B |
| 7 | 22,9±0,821 | 8,73±1,19 | 8,62±1,58 B | 23,5±1,04 B |
| 8 | 23,3±1,92 | 8,47±0,810 | 8,42±1,12 B | 24,3±2,74 B |

A, B: means of slaughter ages with no common superscript differ significantly (P<0,01)
x,y: means of sexes with no common superscript differ significantly (P<0,05)

Table 3. The effects of age and sex on ratios of some internal organs, % of body weight (± SD)

*Çizelge 3.Yaşın ve cinsiyetin canlı ağırlığın yüzdesi olarak bazı iç organlara etkisi*

| Sex<br>*Cinsiyet* | Heart (%)<br>*Kalp* | Liver (%)<br>*Karaciğer* | Gizzard (%)<br>*Taşlık* | Abdominal fat (%)<br>*Karın yağı* |
|---|---|---|---|---|
| Female<br>*Dişi* | 1,36±0,226 | 3,63±1,05 Y | 3,62±0,753 Y | 0,833±0,845 x |
| Male<br>*Erkek* | 1,39±0,178 | 2,86±0,759 X | 2,66±0,663 X | 1,31±1,56 y |
| Week<br>*Hafta* | | | | |
| 5 | 1,39±0,192 | 3,75±1,22 B | 3,33±0,355 | 0,384±0,763 A |
| 6 | 1,34±0,212 | 3,74±1,09 B | 3,26±0,387 | 0,767±0,747 A |
| 7 | 1,29±0,180 | 2,67±0,397 A | 3,22±1,28 | 1,05±0,994 A |
| 8 | 1,38±0,190 | 2,81±0,388 A | 3,04±1,02 | 2,08±1,71 B |

A, B: means of slaughter ages with no common superscript differ significantly (P<0,01)
X, Y: means of sexes with no common superscript differ significantly (P<0,01)
x,y: means of sexes with no common superscript differ significantly (P<0,05)

## Discussion

Age had a significant effect on body weight, carcass weight, carcass yield and breast percent. Body weight was lower (P<0,01) for the quails slaughtered at 5 weeks of age than for all the other ages examined (Table 1). The results agree with those of Jones et al. (1979) and Yalcin et al. (1995) who reported that little growth occurred in quail between 6 and 9 weeks. Also, sex effect was significant on body weight, carcass weight, carcass yield and breast percentage (Table 1) being higher for females than for males at all the ages, but males showed higher carcass yield than females. These results agree with those reported by Tserveni-Gousi and Yannakopoulos (1986), Yalcin et al. (1995), Caron et al. (1990), Minvielle et al. (2000) and Oguz et al. (1996). Carcass yield of quails ranged from 66,9 to 69,2% in terms of ages, and there was found significant difference between 5 and 8 weeks of age. Yalcin et al. (1995) reported that carcass yield of quails ranged from 66 to 73%. Also, Vali et al. (2005) reported that carcass yield of quails was determined 66,24 and 68,23% at 7 and 9 weeks of ages, respectively. Significant difference was found between slaughter ages. Depending on slaughter ages increased, the breast percentage decreased. Breast percentage was found as 37,9 % and 36,8% for females and males, respectively, which were consistent with the other report of Vali et al. (2005). But, Genchev et al. (2008) and Aksit et al. (2003) reported that no significant difference between the sexes in respect to breast percent. Also, Yalcin et al. (1995) reported that there was no significant difference among the slaughter ages in respect to breast percent.

As it was seen Table 2, except wing percent, there were no significant differences between the sexes in terms of thigh percent, neck percent and back percent. But, slaughter ages had significant effect on neck percent and back percent, and significant differences were observed between at 5 weeks of age and other slaughter ages for neck percent and back percent. In contrast to the breast percent, depending on slaughter ages increased, neck percent and back percent decreased. Genchev et al. (2008) reported that significant difference between females (15,97%) and males (16,63%) for thigh percent, and males showed higher value than females. Vali et al. (2005) reported that no significant difference between the males (22,94%) and females (23,19%) in terms of thigh percent. Also, Yalcin et al. (1995) reported that increased age did not effect the wing percent significantly, which was consistent with our result.

As it was presented Table 3, except heart percent, sex had significant effect on gizzard percent, liver percent and abdominal

percent. Females showed higher gizzard percent and abdominal fat percent than males, which were no consistent with other reports (Tserveni-Gousi and Yannakopoulos, 1986; Yalcin et al., 1995; Aksit et al., 2003; Genchev et al., 2008). Also, while there were no significant differences for heart percent and gizzard percent among the quails slaughtered at different ages, abdominal fat percent and liver percent was affected by slaughter age. Similar results were reported by Yalcin et al. (1995). Depending on the age of increased liver percent decreased, for all that abdominal fat percent is increasing.

Although positive phenotypic correlations were determined between the body weight and carcass weight and gizzard percent, there were negative correlations between the carcass yield and breast percent, wing percent and gizzard percent. There was found negative correlation between the breast percent and neck percent (-0,271) and back percent (-0,269). For all that positive correlation was found between breast percent and liver percent. Again, significant negative phenotypic correlations were found between carcass yield and breast percent (-0,261), wing percent (-0,348) and gizzard percent (-0,624). While there was significant phenotypic negative correlation between breast percent and back percent (-0,269), the significant phenotypic correlation between thigh percent and back percent (0,386) was found positively. Similarly, there was found significant phenotypic correlation between gizzard percent and abdominal fat (-0,341) negatively, although it was a positive correlation between carcass weight and abdominal fat percent (0,310). Vali et al. (2005) reported a negative phenotypic correlation between the breast percent and carcass yield (-0,082). Also, they reported negative correlations between the thigh percent and body weight (-0,279), carcass yield (-0,351) and breast percent (-0,157).

From the results obtained, it could be concluded that, sex had significant effect on the body weight and percent of carcass traits. Depending on slaughter ages of increased body weight, carcass weight, neck percent, back percent and abdominal fat percent increased, for all that breast percent, carcass yield, and liver percent reduced. At the same time, thigh percent, wing percent, heart percent and gizzard percent were no affected significantly.

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Table 4. Pearson's correlations among some carcass parts
*Çizelge 4. Bazı karkas parçaları arasındaki pearson korelasyonları*

| Carcass Parts<br>*Karkas parçaları* | Carcass Weight<br>Karkas ağırlığı | Carcass Yield<br>Karkas randımanı | Breast<br>Göğüs | Thigh<br>But | Wing<br>Kanat | Neck<br>Boyun | Back<br>Sırt | Heart<br>*Kalp* | Liver<br>*Karaciğer* | Gizzard<br>*Taşlık* | Abdominal fat<br>*Karın yağı* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Body Weight<br>*Canlı ağırlık* | 0,878** | -0,547** | 0,171 | 0,086 | 0,117 | 0,074 | 0,205 | 0,034 | -0,078 | 0,272* | 0,159 |
| Carcass Weight<br>Karkas ağırlığı | | -0,084 | 0,036 | 0,012 | -0,058 | 0,095 | 0,145 | 0,101 | -0,184 | -0,019 | 0,310** |
| Carcass Yield<br>Karkas randımanı | | | -0,261* | -0,079 | -0,348** | 0,007 | -0,119 | 0,129 | -0,181 | -0,624** | 0,228* |
| Breast<br>Göğüs | | | | 0,11 | -0,065 | -0,271* | -0,269* | 0,096 | 0,225* | 0,087 | -0,209 |
| Thigh<br>But | | | | | 0,202 | 0,001 | 0,386** | 0,199 | -0,118 | -0,159 | 0,115 |
| Wing<br>Kanat | | | | | | 0,096 | -0,147 | -0,121 | 0,018 | 0,293** | -0,202 |
| Neck<br>Boyun | | | | | | | 0,023 | 0,074 | -0,159 | 0,047 | 0,360** |
| Back<br>Sırt | | | | | | | | 0,09 | -0,134 | -0,156 | 0,217 |
| Heart<br>*Kalp* | | | | | | | | | -0,068 | -0,085 | 0,194 |
| Liver<br>*Karaciğer* | | | | | | | | | | 0,155 | -0,116 |
| Gizzard<br>*Taşlık* | | | | | | | | | | | -0,341** |

* P<0,05, **P<0,01