

## CARCASS CHARACTERISTICS OF NAMAKKAL QUAIL -1

S. Karthika and V. Chandirasekaran\*

Department of Livestock Products Technology (Meat Science),  
Veterinary College and Research Institute, TANUVAS,  
Namakkal - 637 002, Tamil Nadu

E-mail: v.chandirasekaran@gmail.com (\*Corresponding Author)

**Abstract:** Namakkal quail -1 was a new breed evolved by 4 ways crossing of Japanese quail. It was mainly developed for meat purpose by TamilNadu Veterinary and Animal Sciences University. Till now no studies were made on Namakkal quail -1. The present study was conducted to evaluate the relationship between slaughter ages, sexes and carcass characteristics of Namakkal quail -1. Birds were slaughtered at 4 and 6 weeks of age. Carcass yield, carcass parts weight, weight of liver, heart, gizzard and alimentary tract were obtained. The results showed that preslaughter weight, hot carcass weight, yield of edible offal and yield of cut up parts were significantly affected by age and sex of the birds. The preslaughter weight and hot carcass weight were high in 6<sup>th</sup> week birds whereas the yield of edible offal was high in 4<sup>th</sup> week birds. This showed that The Namakkal quail-1 meat had high meat yield and good meat quality in short duration of time.

**Keywords:** Carcass yield, Carcass parts, Edible offal and Namakkal quail- 1.

### Introduction

In India, during 1974, central avian research institute imported Japanese quail (*Coturnix coturnix japonica*) from Davis, California for diversification in India. Initially, two species of quail were found in India- black breasted quail found in jungle and brown coloured Japanese quail for meat and egg production, but now there are about 45 species of quails found in India<sup>1</sup>. Though government of India is encouraging entrepreneurs to start quail farm, a government license is required to sell commercial Japanese quail in order to protect the jungle variety quail. Indian male Japanese quail weight about 100 –140g and females weight about 120–160g during the marketing age. The percentage content of edible meat in Japanese quail is very high. Such as breast, leg and wing contain 37.3-38.7 per cent, 22.7-24.4 per cent and 35.9-37.8 per cent respectively. The dressed carcass yield of Japanese quail is 65-70 per cent. The meat of Japanese quail has very good water holding capacity and higher shearing force. The proper economical age for marketing quail is about 6-7 weeks. The Japanese quail under Indian condition it can lay 80-90 eggs/100 days. The life span of quail is about 3- 4 years<sup>2</sup>. Recently, many newer strains have been developed in India. In order to improve the

*Received July 1, 2016 \* Published Aug 2, 2016 \* www.ijset.net*

meat quality of Japanese quail a newer strain was developed by Tamilnadu Veterinary and Animal Sciences University during 2006 for meat purpose. It was produced by 4 ways crossing of pure line Japanese quail. These Namakkal quail – 1 attains an average body weight of 250g in 5<sup>th</sup> week with feed conversion ratio of 3.2. Because of this early body weight gain farmers can fetch quicker high return.

### **Materials and Methods**

24 Birds including 12 males and 12 females of 4<sup>th</sup> and 6<sup>th</sup> week birds were procured from Poultry farm Complex of Department of Poultry Science, Veterinary College and Research Institute, Namakkal and starved for 4 hours and slaughtered as per the standard procedure in the Department of Livestock Products Technology, Veterinary College and Research Institute, Namakkal. Quails were slaughtered by decapitation. Following a 5 min bleeding time, feathers were removed along with skin by hand. Carcasses were eviscerated manually and Weights of liver, heart, gizzard and alimentary tract were taken. After the evisceration, weights of carcass had been taken.

### **Dressing percentage**

Dressing percentage was calculated as the ratio of hot carcass weight and pre slaughter weight.

### **Yield of edible and inedible offal**

Per cent yield of edible offal was calculated as the ratio of edible offal and pre slaughter weight. Per cent yield of in-edible offal was calculated as the ratio of in-edible offal and pre slaughter weight.

### **Yield of cut up parts**

The leg quarters were obtained by separating the thigh from the back at the joint between the femur and ileum, and by separating the tibia and shank at the hock joint. 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. Per cent yield of cut up parts were calculated as the ratio of yield of individual cut up parts and pre slaughter weight.

## **Results and Discussion**

### **Preslaughter weight (g)**

The overall mean preslaughter weight (Table 1) of 4<sup>th</sup> and 6<sup>th</sup> week Namakkal Quail – 1 were 194.91±3.24 and 271.91±6.03 and the mean values for 4<sup>th</sup> and 6<sup>th</sup> week male and female were 199.58±4.27, 190.25±4.66, 254.33±8.45 and 289.50±4.97, respectively.

The analysis of variance revealed highly significant ( $P \leq 0.01$ ) difference between 4<sup>th</sup> and 6<sup>th</sup> week birds and also between male and female birds. The preslaughter weight was higher in 6<sup>th</sup> week birds and among the 6<sup>th</sup> week birds, female birds showed higher preslaughter weight. As age advances the preslaughter weight increases<sup>3</sup>. Reported that in Japanese quail the preslaughter weight of 4<sup>th</sup> and 8<sup>th</sup> week quail were 130.38g and 1750g and as the age increases the preslaughter weight increases. Similarly an increase in pre slaughter was observed in 5, 6, 7 and 8<sup>th</sup> week Japanese quail<sup>4</sup>. Between sexes, similar report was found in Japanese quail<sup>5</sup>. The live weight was higher in female birds than the male birds (129.43 and 28.50g) respectively.

### **Hot carcass weight (g)**

The overall mean value of 4<sup>th</sup> and 6<sup>th</sup> week Namakkal Quail -1 hot carcass weight (Table 1) were  $121.75 \pm 2.34$  and  $170.50 \pm 4.13$ , respectively and mean values for hot carcass weight were  $123.66 \pm 2.76$  and  $119.83 \pm 3.81$  for 4<sup>th</sup> week male and female birds,  $159.75 \pm 5.58$  and  $181.25 \pm 4.38$  for 6<sup>th</sup> week male and female birds, respectively.

The analysis of variance showed that there is highly significant ( $P \leq 0.01$ ) difference between 4<sup>th</sup> and 6<sup>th</sup> week old birds. The 6<sup>th</sup> week birds show higher hot carcass weight and between sexes, 6<sup>th</sup> week female shows higher hot carcass weight than the male and 4<sup>th</sup> week male and female birds. As the age increases the hot carcass weight also increases<sup>6,7</sup>. But in 0 to 52 weeks Japanese quail<sup>8</sup>, it was reported that sex has no significant effect on the carcass yield

### **Dressing percentage**

The overall mean dressing percentage of 4<sup>th</sup> and 6<sup>th</sup> week birds (Table1) were  $62.48 \pm 0.68$  and  $62.68 \pm 0.50$  and the mean values for dressing percentage of male and female of 4<sup>th</sup> and 6<sup>th</sup> week birds were  $61.97 \pm 0.71$ ,  $62.98 \pm 1.19$ ,  $62.82 \pm 0.63$  and  $62.55 \pm 0.79$ , respectively.

Analysis of variance revealed that the sex and age has shown no significant ( $P > 0.05$ ) difference in the dressing percentage of Namakkal Quail – 1 birds. Between sexes on agreed with this, a report state that<sup>9</sup>, in Grey partridges the sex had no significant ( $P > 0.05$ ) effect on dressing percentage on 32 weeks old birds. The dressing percentage of male and female birds was 72.4 per cent and 72.9 per cent respectively. Between ages on contravercy to this a report state that<sup>10</sup>, in Japanese quail the dressing percentage increase from 5<sup>th</sup> week onwards this was agreed in Japanese quail<sup>4</sup>.

The dressing percentage of chicken 64.5%<sup>11</sup>, geese 56.4%<sup>11</sup>, Japanese quail 72.2%<sup>11</sup> and for duck 65.28-71.18%<sup>12</sup>. In this present study the dressing percentage of Namakkal quail-1 was

ranged between (61.97-62.98%) respectively, which is higher than geese but lower than Japanese quail, chicken and duck

#### **Yield of edible offal (per cent)**

The overall mean value for per cent yield of edible offal for 4<sup>th</sup> and 6<sup>th</sup> week Namakkal Quail -1 were (Table 1 and 2)  $6.94 \pm 0.16$  and  $5.82 \pm 0.16$  and the mean values for male and female were  $7.08 \pm 0.27$ ,  $6.81 \pm 0.19$  and  $5.84 \pm 0.26$ ,  $5.79 \pm 0.20$  for 4<sup>th</sup> and 6<sup>th</sup> week, respectively. The edible offal of Namakkal Quail includes heart, liver and gizzard. The mean values of this individual edible offal were  $0.85 \pm 0.05$  and  $0.92 \pm 0.05$ ,  $2.02 \pm 0.10$  and  $2.11 \pm 0.09$ ,  $4.07 \pm 0.11$  and  $2.78 \pm 0.08$  for 4<sup>th</sup> and 6<sup>th</sup> week birds, respectively.

The mean value of heart, liver and gizzard of male and female of 4<sup>th</sup> week were  $0.84 \pm 0.07$  and  $0.86 \pm 0.06$ ,  $2.25 \pm 0.14$  and  $1.79 \pm 0.11$ ,  $3.98 \pm 0.16$  and  $4.16 \pm 0.16$  and for 6<sup>th</sup> week were  $0.93 \pm 0.08$  and  $0.91 \pm 0.07$ ,  $2.09 \pm 0.14$  and  $2.14 \pm 0.12$ ,  $2.82 \pm 0.12$  and  $2.74 \pm 0.12$ , respectively.

The overall percentage yield of edible offal had highly significant ( $P \leq 0.01$ ) effect on age and sex of the birds. The 4<sup>th</sup> week male birds had higher yield of edible offal. On contrary to this, a reported stated that sex does not significantly ( $P > 0.05$ ) affect the yield of edible offal in 4<sup>th</sup> week of age<sup>13</sup>. The edible offal in Namakkal quail-1 includes heart, liver and gizzard. The yield of individual offal's also significantly affected by age and sex of the birds. Between sexes, the giblet percentage was higher in females than the males in 4<sup>th</sup> and 6<sup>th</sup> weeks Japanese quail<sup>14</sup> and similar trend was noticed in Japanese quail of 5<sup>th</sup> and 7<sup>th</sup> week age birds<sup>4</sup>. The female have higher gizzard percent than the males. Between ages, in present study the 4<sup>th</sup> week bird showed higher gizzard yield than heart and liver yield in compared to 6<sup>th</sup> week birds. On contrary, a report stated that there were no significant difference ( $P > 0.05$ ) for heart percent and gizzard percent among the quails slaughtered at different ages<sup>15</sup>. As the age advances the heart yield increases this may be due to increased blood circulation in order to fulfill the elevated oxygen needs of growing birds<sup>16</sup>.

#### **Yield of inedible offal (per cent)**

The mean values of yield of inedible offal were (Table 1 and 2)  $18.78 \pm 0.72$ ,  $19.15 \pm 0.61$ ,  $18.57 \pm 0.64$  and  $17.87 \pm 0.72$  respectively for male and female of 4<sup>th</sup> and 6<sup>th</sup> week birds. The overall mean for 4<sup>th</sup> and 6<sup>th</sup> week birds were  $18.97 \pm 0.46$  and  $18.22 \pm 0.48$ , respectively.

The inedible offal includes blood, feather with skin, head, feet and intestine with content. The overall mean values for this inedible offal were  $1.15 \pm 0.06$ ,  $0.94 \pm 0.04$  for blood yield,  $4.40 \pm 0.09$ ,  $4.04 \pm 0.11$  for head yield,  $2.40 \pm 0.13$ ,  $2.07 \pm 0.05$  for feet yield,  $4.02 \pm 0.16$ ,

5.02±0.20 for feather and skin yield and 6.97±0.29, 6.13±0.34 for intestine with content yield for 4 and 6 week birds, respectively.

The analysis of variance showed that except intestine with content other inedible offal showed higher significant ( $P \leq 0.01$ ) effect on both sex and age of the birds. The blood yield was higher in 4<sup>th</sup> week male birds (1.28±0.09), head and feather with skin yield was higher in 6<sup>th</sup> week male birds (4.42±0.13 and 5.22±0.30) and the feet weight was higher in 4<sup>th</sup> week female birds (2.59±0.23) respectively. But in total, the per cent yield of inedible offal was not significantly ( $P > 0.05$ ) affected by sex and age of the birds. Similar trend was noticed in Japanese quail, the yield of leg was high in females but the yield of intestine was higher in males<sup>17</sup>. Similar to this result a report state<sup>18</sup> that blood volume decrease with age, between sexes the blood volume were not apparent to 6<sup>th</sup> weeks, but females shows less blood percent than the male birds.

#### **Yield of cut up parts (per cent)**

The cut up parts of quail includes neck, wing, back, breast and leg. The overall mean of 4<sup>th</sup> and 6<sup>th</sup> week Namakkal Quail – 1 cut up parts (Table 3) were, 2.55±0.16, 2.51±0.09 for neck yield, 5.50±0.18, 4.22±0.17 for wing yield, 10.41±0.51, 10.46±0.48 for back yield, 16.55±0.48, 15.86±0.48 for leg yield and 27.10±0.64, 28.54±0.62 for breast yield, respectively.

The mean value for yield of neck, wing, back, breast and leg for 4<sup>th</sup> and 6<sup>th</sup> week males were, 2.42±0.18 and 2.48±0.13, 5.53±0.28 and 4.54±0.32, 10.30±0.72 and 10.50±0.70, 16.60±0.73 and 16.22±0.90 and 26.55±0.81 and 26.65±1.16, respectively, The mean value for yield of neck, wing, back, breast and leg for 4<sup>th</sup> and 6<sup>th</sup> week females were 2.68±0.28 and 2.53±0.13, 5.47±0.24 and 3.91±0.07, 10.53±0.77 and 10.43±0.68, 16.50±0.67 and 15.50±0.38, 27.65±0.01 and 28.43±0.53, respectively.

The analysis of variance showed that except the wing yield, the yield of back, leg, neck and breast were not significantly ( $P > 0.05$ ) affected by the age and sex of the birds. The wing yield was higher in 4<sup>th</sup> week male birds. Between sexes on agree with this a report<sup>4</sup> state that except wing percent, there were no significant difference ( $P > 0.05$ ) between sexes in terms of thigh per cent, neck per cent and back per cent in 5 weeks Japanese quail. Between ages on controversy to this in Japanese quail a report state that there was no significant difference in the cut up parts yield<sup>19</sup>. In Japanese quail as the age increases there is increase in mean breast yield and also exhibited significant increase in mean percent breast yield of back with the age increases<sup>20,21</sup>.

The primal cut of different spent layer types (Chicken, Japanese quail and Geese) as expressed in percentage of live weight ranged<sup>11</sup> as wing (6.40-11.46%), breast(12.14-22.37%), drum stick (6.26-8.50%), thigh (5.04-10.2%), and back(14.13-16.18%). Japanese quail was observed to have the highest value for breast, thigh and while the highest for wing was found in Geese. Comparing this, the Namakkal quail-1 have the highest value for breast and thigh per cent. This shows that Namakkal quail-1 has good meat yield at early age.

### Conclusion

The result of the present study revealed that, the 6<sup>th</sup> week Namakkal quail-1 has more advantages on meat quality than 4<sup>th</sup> week birds. The carcass characteristics showed that the yield of meat was high in 6<sup>th</sup> week birds and also in female birds since Namakkal quail-1 was mainly evolved for meat purpose. The Namakkal quail-1 meat had high meat yield and good meat quality in short duration of time when compared with Japanese quails. So Namakkal quail-1 can be preferred for rearing under cage system over Japanese quail for higher economic returns.

**Table 1: Mean ( $\pm$ ) S.E. of carcass characteristics of 4 and 6 weeks old Namakkal Quail- 1**

Parameters	4 <sup>th</sup> week		Overall mean	6 <sup>th</sup> week		Overall mean
	Male	Female		Male	Female	
Pre slaughter weight (g)	199.58 $\pm$ 4.27 <sup>b</sup>	190.25 $\pm$ 4.66 <sup>b</sup>	194.91 $\pm$ 3.24 <sup>x</sup>	254.33 $\pm$ 8.45 <sup>c</sup>	289.50 $\pm$ 4.97 <sup>a</sup>	271.91 $\pm$ 6.03 <sup>y</sup>
Hot carcass weight (g)	123.66 $\pm$ 2.76 <sup>b</sup>	119.83 $\pm$ 3.81 <sup>b</sup>	121.75 $\pm$ 2.34 <sup>x</sup>	159.75 $\pm$ 5.58 <sup>c</sup>	181.25 $\pm$ 4.38 <sup>a</sup>	170.50 $\pm$ 4.13 <sup>y</sup>
Dressing percentage	61.97 $\pm$ 0.71	62.98 $\pm$ 1.19	62.48 $\pm$ 0.68	62.82 $\pm$ 0.63	62.55 $\pm$ 0.79	62.68 $\pm$ 0.50
Yield of edible offal	7.08 $\pm$ 0.27 <sup>a</sup>	6.81 $\pm$ 0.19 <sup>a</sup>	6.94 $\pm$ 0.16 <sup>x</sup>	5.84 $\pm$ 0.26 <sup>b</sup>	5.79 $\pm$ 0.20 <sup>b</sup>	5.82 $\pm$ 0.16 <sup>y</sup>
Yield of inedible offal	18.78 $\pm$ 0.72	19.15 $\pm$ 0.61	18.97 $\pm$ 0.46	18.57 $\pm$ 0.64	17.87 $\pm$ 0.72	18.22 $\pm$ 0.48

Means bearing different superscripts differ significantly ( $P \leq 0.05$ ).

**Table 2: Mean ( $\pm$ ) S.E. of per cent yield of edible and inedible offal of 4 and 6 weeks old Namakkal Quail- 1**

Parameters	4 <sup>th</sup> week		Overall mean	6 <sup>th</sup> week		Overall mean
	Male	Female		Male	Female	
Heart	0.84 $\pm$ 0.07	0.86 $\pm$ 0.06	0.85 $\pm$ 0.05	0.93 $\pm$ 0.08	0.91 $\pm$ 0.07	0.92 $\pm$ 0.05
Liver	2.25 $\pm$ 0.14 <sup>a</sup>	1.79 $\pm$ 0.11 <sup>b</sup>	2.02 $\pm$ 0.10	2.09 $\pm$ 0.14 <sup>ab</sup>	2.14 $\pm$ 0.12 <sup>ab</sup>	2.11 $\pm$ 0.09
Gizzard	3.98 $\pm$ 0.16 <sup>a</sup>	4.16 $\pm$ 0.16 <sup>b</sup>	4.07 $\pm$ 0.11 <sup>x</sup>	2.82 $\pm$ 0.12 <sup>b</sup>	2.74 $\pm$ 0.12 <sup>b</sup>	2.78 $\pm$ 0.08 <sup>y</sup>
Blood	1.02 $\pm$ 0.06 <sup>b</sup>	1.28 $\pm$ 0.09 <sup>a</sup>	1.15 $\pm$ 0.06 <sup>x</sup>	1.00 $\pm$ 0.06 <sup>b</sup>	0.89 $\pm$ 0.05 <sup>b</sup>	0.94 $\pm$ 0.04 <sup>y</sup>
Head	4.50 $\pm$ 0.13 <sup>a</sup>	4.29 $\pm$ 0.14 <sup>a</sup>	4.40 $\pm$ 0.09 <sup>x</sup>	4.42 $\pm$ 0.13 <sup>a</sup>	3.67 $\pm$ 0.09 <sup>b</sup>	4.04 $\pm$ 0.11 <sup>y</sup>
Feet	2.22 $\pm$ 0.12 <sup>ab</sup>	2.59 $\pm$ 0.23 <sup>a</sup>	2.40 $\pm$ 0.13 <sup>x</sup>	2.24 $\pm$ 0.07 <sup>ab</sup>	1.90 $\pm$ 0.06 <sup>b</sup>	2.07 $\pm$ 0.05 <sup>y</sup>
Feather with skin	3.96 $\pm$ 0.19 <sup>b</sup>	4.08 $\pm$ 0.28 <sup>b</sup>	4.02 $\pm$ 0.16 <sup>x</sup>	5.22 $\pm$ 0.30 <sup>a</sup>	4.82 $\pm$ 0.28 <sup>a</sup>	5.02 $\pm$ 0.20 <sup>y</sup>
Intestine with content	7.05 $\pm$ 0.53	6.90 $\pm$ 0.27	6.97 $\pm$ 0.29	5.68 $\pm$ 0.38	6.57 $\pm$ 0.56	6.13 $\pm$ 0.34

Means bearing different superscripts differ significantly ( $P \leq 0.05$ ).

**Table 3: Mean ( $\pm$ ) S.E. of per cent yield of cut up parts of 4 and 6 weeks old Namakkal Quail- 1**

Parameters	4 <sup>th</sup> week		Overall mean	6 <sup>th</sup> week		Overall mean
	Male	Female		Male	Female	
Neck (per cent)	2.42 $\pm$ 0.18	2.68 $\pm$ 0.28	2.55 $\pm$ 0.16	2.48 $\pm$ 0.13	2.53 $\pm$ 0.13	2.51 $\pm$ 0.09
Wing (per cent)	5.53 $\pm$ 0.28 <sup>a</sup>	5.47 $\pm$ 0.24 <sup>a</sup>	5.50 $\pm$ 0.18 <sup>x</sup>	4.54 $\pm$ 0.32 <sup>b</sup>	3.91 $\pm$ 0.07 <sup>b</sup>	4.22 $\pm$ 0.17 <sup>y</sup>
Back (per cent)	10.30 $\pm$ 0.72	10.53 $\pm$ 0.77	10.41 $\pm$ 0.51	10.50 $\pm$ 0.70	10.43 $\pm$ 0.68	10.46 $\pm$ 0.48
Leg (per cent)	16.60 $\pm$ 0.73	16.50 $\pm$ 0.67	16.55 $\pm$ 0.48	16.22 $\pm$ 0.90	15.50 $\pm$ 0.38	15.86 $\pm$ 0.48
Breast (per cent)	26.55 $\pm$ 0.81	27.65 $\pm$ 1.01	27.10 $\pm$ 0.64	28.65 $\pm$ 1.16	28.43 $\pm$ 0.53	28.54 $\pm$ 0.62

Means bearing different superscripts differ significantly ( $P \leq 0.05$ ).

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