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Effect of Sex and Different Housing Systems on the Performance of Japanese Quails under Varying Floor Densities in Puducherry

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ABSTRACT

The effect of different management systems on the performance of Japanese quails in Puducherry on live body weight and carcass characteristics of Coturnix quails were examined in this study. A total of 600 birds were utilized for the study in two management systems, cage and deep litter, under varying floor space of 150, 175 and 200 sq. cm per bird. Each system comprised 300 birds with three floor densities and each floor densities had two replicates with 50 birds in each. Six-hundred-day-old quails purchased from local hatcheries were kept on separate cage system and deep litter system under varying floor densities were fed ad libitum. At the end of the 6-week, twelve birds of both sexes equally from each replicate were slaughtered in the Department of Livestock Products Technology (LPT), of the institute and carcass traits were recorded. The carcasses were processed and the live weight, dressed weight, eviscerated weight, giblet weight and inedible parts weights were measured. Higher values were obtained for female quails in respect of live weight, dressed weight, eviscerated weight, giblet weight and inedible parts weight with regard to housing system, cage and deep litter under varying floor densities. The weight of visceral organs also significantly ($P<0.05$) differed among the sexes of the quails. Consequently, it was concluded that quail breeding for carcass components both edible and visceral organs were favored for female Japanese quail and were better than the male quails in different systems under varying floor densities.

Key words: Housing system, floor density, carcass traits, live weight, dressed weight.

INTRODUCTION

The global scenario regarding progress and development of poultry industry highlights that the Japanese quail (*Coturnix coturnix japonica)* has opened a new era in the commercial exploitation. The world-wide interest in commercial Japanese quail farming is increasing day by day because of its high growth rate, early sexual maturity and egg production, shorter generation interval, quick return, less feed consumption and minimum floor space require-

ment, shorter incubation period, resistance to many common chicken diseases, high acceptability of its quality meat and egg (Padmakumar *et al*., 2000, Roshdy *et al*., 2010 and El-Tarabany *et al*., 2015). Many varieties/strains of quails have been developed, among which Japanese quail is the most common and popular as commercial bird.

The Japanese quails are popular for high protein (23%) and less fat (3%) meat which is renowned for taste and tenderness. It promotes body and brain development in children, it is a balanced food for pregnant and nursing mother, it is a protein rich food for the patients of tuberculosis and *chronic* respiratory diseases, heart patients can consume it safely without the fear of cholesterol. The Japanese quail meat is also known for rejuvenation of health in human (Jadhav and Siddiqui, 1999). Japanese quail eggs are good source of thiamine and riboflavin.

Females having a larger body size than males unlike other poultry species (Sezer *et al*., 2006). The differences in growth pattern between sexes are also a well-known phenomenon (Sezer and Tarhan, 2005). Bonos *et al.* (2010) reported that female quail had a higher body and carcass weights than males. These findings of the researchers were in accordance with previously published paper (Shim, 2005). Selim *et al.* (2006) studied the effect of sex on live body weight, slaughter weight and carcass weight and reported higher carcass yields for females than males. The authors found percent carcass yield to be 75.47% and 73.4%, respectively for females and males. Recent study conducted on carcass characteristics of quails by Tarhyel *et al*. (2012) gave similar results. The investigators observed that females had higher mean values in live body weight, breast weight, carcass weight, back weight and thigh weight than males. In addition, Caron *et al.* (1990) and Yalcin *et al.* (1995) reported sex differences in Japanese quail carcass traits for unadjusted values of breast muscle weight and thigh muscles.

Advancing reasons for sex differences in live body weight and carcass yields, Mark (1990) reported that smaller body weight of males was due to their higher metabolic rate, while Selim *et al.* (2006) said that decrease in live weight in male Japanese quail was as a result of performance of male sexual activities due to hormonal change. Similarly, Toelle *et al.* (1991) found a significant effect of sex for all carcass traits with the exception of thigh weight.

MATERIALS AND METHODS

An experiment was conducted to study the effect of different management systems on the performance of Japanese quails in Puducherry at the Department of Livestock Production Management, Rajiv Gandhi Institute of Veterinary Education and Research, Kurumbapet, Puducherry. The experiment was conducted during the period from March 29, 2021 to May 10, 2021. The day-old Japanese quail chicks (Namakkal II) were procured from a private hatchery in Puducherry and utilized for the study.

A total of 600-day old chicks were randomly divided into two treatment groups i.e., for cage system (T1 - 300 birds) and for deep litter system (T2 -300 birds). Each treatment group was divided into three replicates with 100 birds in each. Individual chicks were wing banded and randomly allotted into different groups.

Parameters Studied

The parameters studied are weekly body weight, weekly feed consumption, cumulative FCR, cumulative mortality and carcass traits at six weeks of age. Individual body weights were recorded weekly and at the end of the experiment, 42nd day, a total of twelve birds from each replicate under varying floor densities were slaughtered in the Department of Livestock Products Technology (LPT), of the institute and carcass traits were recorded. A total of 72 birds (all groups) were slaughtered as per standard slaughter procedure and various carcass traits recorded.

Statistical Analysis

The data was analyzed using SPSS 18.0 as per Snedecor and Cochran, 1994

RESULTS AND DISCUSSION

At the end of 6th week live weight (g), dressed weight, eviscerated weight, giblet weight and inedible parts weight of the birds slaughtered were 218.61±7.41 and 222.38±7.41, 151.88±3.90 and 158.08±3.90, 141.16±3.94 and 147.08±3.94, 10.72±0.20 and 11.02±0.20, 66.72±3.81 and 64.30±3.81 under cage and deep litter systems, respectively (Table-1). There was no significant (P>0.05) difference between the management systems with respect to all the carcass traits.

The values observed in cage system in the present trial were higher than the values recorded by Mandal (1993), Shrivastava (1995), Vali (2005) and Selim Kul (2006) and Dogan (2012) in cage reared birds. Raji (2009) reported lower values than the present study for floor reared birds. From the present study it was observed that system of rearing had no influence on dressing percentage.

Table 1: Carcass traits of Japanese quails (at 6 weeks) under different systems of management in Puducherry (mean±SE).

	Live Wt. (g)	Dressed		Eviscerated		Giblet		Inedible parts	
		wt. (g)	%	wt.	%	wt.	%	wt.	%
Cage system	218.61± 7.41	151.88± 3.90	69.65	141.16± 3.94	64.71	10.72± 0.20	4.93	66.72± 3.81	30.34
Deep system	222.38± 7.41	158.08± 3.90	71.13	147.08± 3.94	70.68	11.02± 0.20	4.97	64.30 ±3.81	28.86
Significance	0.73^{NS}	0.31^{NS}		0.33^{NS}		0.33^{NS}		0.67^{NS}	

Table 2: Carcass traits (g) of Japanese quails (at 6 weeks) under varying densities in different systems of management in Puducherry (mean±SE).

	Cage system				Deep litter			
Floor space	150Sq cm/ bird	175Sq cm/ bird	200Sq cm/ bird	Sig.	150Sq cm/ bird	175Sq cm/ bird	200Sq cm/ bird	Signifi-cance
Live wt.	215.92±6.28	219.75±8.79	220.17±9.44	0.92^{NS}	217.75±7.81	220.42±7.05	229.00±6.58	0.51^{NS}
Dressed wt.	152.83±3.85	151.25±6.19	151.58±5.29	0.97^{NS}	156.42±5.23	156.25±4.82	161.58±5.35	0.70^{NS}
Eviscerated wt.	142.50±3.54	140.58±5.85	140.42±5.25	0.94^{NS}	145.67±4.84	145.42±4.65	150.17±5.29	0.74^{NS}
Giblet wt.	10.33± 0 .46	10.67± 0 .43	11.17± 0.50	0.45^{NS}	10.83± 0.50	10.83± 0.42	11.42±0.31	0.53^{NS}
Inedible parts wt.	63.08± 3.48	68.50 ±3.30	68.58± 2.29	0.54^{NS}	61.33± 2.97	64.17± 2.99	67.42±1.64	0.32^{NS}

The least square means of live weight (g) under different floor densities in cage system and deep litter system was 215.92±6.28, 219.75±8.79, 220.17±9.44 and 217.75±7.81, 220.42±7.05, 229.00±6.58, at 150, 175 and 200 sq cm, respectively (Table-2).

The least square means of dressed weight (g) under different floor densities in cage system and deep litter system was 152.83±3.85, 151.25±6.19, 151.58±5.29 and 156.42±5.23, 156.25±4.82, 161.58±5.35 at 150, 175 and 200 sq cm, respectively (Table-2).

The least square means of eviscerated weight (g) under different floor densities in cage system and deep litter system was 142.50±3.54, 140.58±5.85, 140.42±5.25 and 145.67±4.84, 145.42±4.65, 150.17±5.29 at 150, 175 and 200 sq cm, respectively (Table-2).

The least square means of giblet weight (g) under different floor densities in cage system and deep litter system was 10.33±0.46, 10.67±0.43, 11.17±0.50, and 10.83±0.50, 10.83±0.42, 11.42±0.31 at 150, 175 and 200 sq cm, respectively (Table-2).

The least square means of inedible parts weight (g) under different floor densities in cage system and deep litter system was 63.08±3.48, 68.50±3.30, 68.58±2.29 and 61.33±2.97, 64.17±2.99, 67.42±1.64 at 150, 175 and 200 sq cm, respectively (Table-2).

Statistical analysis revealed no significant (P>0.05) difference among live weight, dressed weight, eviscerated weight, giblet weight and inedible parts weight under varying floor densities in different management systems. The results obtained in the present study for carcass characteristics under varying floor densities were higher than the values reported by Mahrose (2018) in cage reared birds. The present study revealed that the systems of management under different densities had no effect on carcass traits.

Table 3 represents the sex of birds on the edible and inedible parts of Japanese quail. There were significant (P <0.05) differences between the sex of the birds, edible and inedible carcass composition. Live weight, dressed weight, eviscerated weight, giblet weight and inedible parts weight was higher in female birds than the male birds under cage and deep litter system, respectively.

With regard to sex differences (Table 3) at the end of 6^{th} week the live weight, dressed weight, eviscerated weight, giblet weight and inedible parts for male and females under cage system were 209.22 and 228, 144.61 and 159.16, 134.55 and 147.77, 10.05 and 11.38, 64.61 and 68.83, respectively and correspondingly in deep litter system it was 210.05 and 234.72, 148.83 and 167.33, 138.72 and 155.44, 10.11 and 11.94, 61.22 and 67.38. Therefore, females recorded higher and superior (P<0.01) mean values than males at 10th

Table 3: Effect of sex on carcass traits (g) of Japanese quails (at 6 weeks) under varying densities in different systems of management in Puducherry (mean±SE).

Weight(g)	Sex	Live wt.	Dressed		Eviscerated		Giblet		Inedible parts	
			Wt.	%	Wt.	%	Wt.	%	Wt.	%
Cage system	Male	209.22	144.61	69.07	134.55	64.25	10.05	4.82	64.61	30.92
	Female	228	159.16	70.23	147.77	65.17	11.38	5.05	68.83	29.76
Deep litter	Male	210.05	148.83	70.86	138.72	70.63	10.11	4.83	61.22	29.13
	Female	234.72	167.33	71.39	155.44	70.73	11.94	5.12	67.38	28.60
Significance.		0.73^{NS}	0.31^{NS}		0.33^{NS}		0.33^{NS}		0.67^{NS}	

week of age regardless of housing system adopted. The well-known difference of body size between females and males was also observed in this study. This is consistent with the observations of previous researchers (Yalcin *et al*, 1995; Bonos *et al*., 2010). Females having a larger body size than males unlike other poultry species (Sezer *et al.,* 2006). The differences in growth pattern between sexes are also a well-known phenomenon (Sezer and Tarhan, 2005). The findings of the researchers were in accordance with previously published paper (Shim, 2005). Selim *et al*. (2006) studied the effect of sex on live body weight, slaughter weight and carcass weight were reported higher for females than males. The higher values of carcass traits in the present study compared to the reviewed reports could be due to the variation in the strain under study.

CONCLUSION

The present study revealed that there was uniform growth and body weight between cage and deep litter system of housing. There was uniformity among the carcass traits studied in both the systems under varying floor densities. This work has shown that either cage or deep litter system could be used to raise quail birds without any adverse consequences on their welfare, growth and development. It was concluded that female quails were better in carcass traits when compared to those of male quail 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 farming is recommended.

COMPETING INTERESTS

The authors do not have any competing interests among themselves or others related to this research work.

ETHICAL STATEMENT

Not applicable

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