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PERFORMANCE OF JAPANESE QUAIL ON DIFFERENT MANAGEMENT SYSTEM

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ABSTRACT

This study was conducted to investigate the effect of two management system; deep litter and cage system on performance of Japanese quail, as management plays an importanat role in growth, carcass quality in terms of yield and nutritional composition as well as laying performance. Two hundred Japanese quail of two weeks old were selected randomly and divided into two groups with two replicates of hundred quails in each with male and female ratio of 1:1 and housed in cages and deep litter system. Body weights, carcass yield, dressing percentage, egg production were recorded during the experimental period. The results revealed significant difference ($p<0.01$) between the two systems of rearing on most of the studied parameters. Increased body weight, feed conversion ratio and significantly higher dressing percentage ($p<0.01$) was observed in cage system. In the contrary percentage of laying, egg numbers, egg weight, yolk index, albumen index and shell thickness etc. are improved in deep litter system of management. Thhus, it may be concluded that although cage system is best suited for growth as well as carcass yield, deep litter system of management is more suitable and economical for rural people as this system of management also improves laying performance of Japanese quails.

Key Words : Japanese quail, deep litter system and cage system.

The Japanese quail (***Coturnix coturnix japonica***), due to its easy maintenance, low feed requirement, early sexual maturity, shorter generation interval, better meat flavour, high rate of egg production has become a pilot animal in the field of research. The bird is generally used for meat purpose and the egg is mostly used for pickle production. These types of birds can be reared both in cages and deep litter system of management. The objective of the present study was made to assess performance of Japanese quail in terms of growth, carcass quality as well as laying performance on deep litter and cage system of management.

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MATERIALS AND METHODS

This experiment was carried out at Poultry Farm unit of Apollo College of Veterinary Medicine, Jaipur. Two hundred numbers of two weeks old birds were individually weighted and randomly divided into two equal experimental groups according to the system of rearing. One group was kept in Deep litter providing 10 sq. inches of floor space per quail. Locally available saw dust was used as litter material. The other group was kept in cages (100x80x35 cm). Each group was again subdivided into two replicates of fifty quails in each with male and female ratio of 1:1. Both the experimental groups were provided with ration containing 22.55% CP and 283 ME Kcal/Kg (on DMB) upto 5th weeks of age. From 6th weeks of age all the birds were fed with ration containing 20.24% CP and 2714 MEKcal/kg. Approximate 1% Ca was offered to the birds from 2-5 weeks of age. From 6th weeks onward the level of Ca was increased to approximate 2.5% to both the groups.

After 6th weeks of age the birds were provided with 12hr natural sunlight plus 4 hr artificial light period. The feed ingredients used in the ration were maize, soyabean meal, rice polish, fish meal, salt, dicaciumphosphate, slat, trace mineral & vitamin mixture, L-lysine, DL-methionine and antibiotic supplements. Wholesome drinking water was provided to all the birds throughout the experimental period. Feeding trial was continued upto 14 weeks of age. The individual body weights at weekly interval and daily feed consumption were recorded. At the age of 8 weeks 10 quails from each group 5 male and 5 females were slaughtered and carcass yields were determined. Age at 1st laying, daily egg production from laying to 14 weeks of age, egg numbers, egg weight (g) were recorded. A total of 100 quail eggs were used to measure egg quality traits (50 from deep litter system and 50 from cage system of rearing at 10th and 14th weeks. Eggs from each experimental group were collected, weighed and broken out. Egg shape index, yolk index, albumen index and shell thickness were measured. Proximate composition of the feed was analyzed as per AOAC (1990). Calcium and phosphorous was estimated as per the method described by Talapatra *et al*. (1940). Energy content of feed was determined by adiabatic bomb calorimeter following standard procedure. Data were analyzed as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Chemical composition of the ration

The ingredient and chemical composition (Table 1) of the ration fed to the experimental birds from from 2nd to 5th weeks and 6th to 14th weeks of age were 10.42% DM, 22.55% CP, 5.12% CF, 2.54% EE, 15.54% T ash, 1.15% Calcium, 0.47% Available phosphorus, 2835 MEKcal/kg and 10.84% DM, 20.12% CP, 6.05%CF, 2.33%EE, 16.13% T ash, 2.62% Calcium, 0.85% Available phosphorus, 2712 MEkcal/kg (on DMB) respectively)

Growth performance

Average body weights of male and female quails as affected by different housing systems are presented in the table (2). Results indicated that the body weight of the female quails were significantly ($p<0.01$) higher than the males for both cage and deep litter system. Hassan *et al.* (2003) also reported higher body weight gain in female quails from 2-5 weeks of age under ad libitum feeding with ration containing 24.8% crdue protein and 2825 MEKcal/kg. This male be due to the proportionately higher weight of alimentary tracty in female as reported by Tserveni-Gousi and Jannakopoulos, (1986). Better feed conversion ratio was observed in the birds of cage system as compared to the deep litter system and also in case of female birds as compared to the male birds in both the management system. The growth was significantly higher for both male and female in cage system rather than under deep litter system of management. This may probably due to the more activity of the birds reared on deep litter system predisposing comparatively more body metabolism than those in the cages.

Carcass yield and dressing percentage

The carcass yield as well as dressing percentage was significantly ($p<0.01$) higher in male quails. Similar findings were also reported by Buragohain *et al* (2010). System of rearing also found to have significant ($p<0.01$) effects on both carcass yield and dressing percentage with highr amount under cage than the deep litter system. The data on yield from breast, leg, back, neck and wings are presented in the table (20> Sex had significant influence on yield of breast, thigh, back, neck and wing portion with greater values in male quails irrespective of rearing system. The higher carcass yield as well as dressing percentage in cage system of rearing may be due to better nutrient utilization than on deep litter system with the same feeding regime. However, both sex and management had significant effects on the yields of edible offal, but were comparatively greater in male quails.

Laying and egg production performance

The data on laying performance as well as egg quality of the Japanese quail birds rearing on

cage and deep litter system is presented in the table (3). Birds kept on deep litter system had significantly higher ($p<0.01$) laying performance in terms of laying percentage, egg numbers, egg weight than those kept in cages which is in agreement with Pavlovski et al. (1992) who also reported that egg production was significantly higher ($p0<0.01$) when layers were housed in deep litter system than keeping them in cages. In relation to egg weight, Hidalgo et al., (2008) reported that egg weight was comparatively higher which were collected from deep litter system than those collected from cages. The egg quality in terms of yolk index, albumen index, egg shape index and egg shell thickness was also comparatively higher in case of eggs collected from deep litter system than those collected from cages. Ozbey and Esen (2007) also reported that deep litter and cage system of rearing had significant effect on egg quality traits. However the haugh unit value was higher in the eggs collected from cages. Similar findings were also reported by M. Roshdy et al. (2010). There exists no significance differences in shell thickness of the egg shell thickness was significantly higher in deep litter system as compared to cage system.

Table 1 Ingredients and Chemical Composition of the Experiemental Ration

Ingredients	Parts (%)	
	2-5 Weeks	6-14 Weeks
Maize	40	40
Rice Polish	18	26
Soya Bean Meal	35	25
Fish Meal	35	25
Salt	0.2	0.2
Dicalcium Phosphate	1.5	0.3
Trace Mineral & Vit	0.2	0.2
L-Lysine	0.1	0.1
DL-Methionine	0.1	0.1
Antibiotic supp	0.1	0.1
Chemical Composition		
CP (%)	22.55	20.24
ME (Kcal/Kg)	2835	2714
CF (%)	5.12	6.05
EE (%)	2.54	2.33
Total ash (%)	15.54	16.13
Ca (%)	1.15	2.62
Av P (%)	0.47	0.85

Trace Mineral and Vit per 100 kg diet: ferrous sulphate 20g, Manganese sulphate 25g, Zinc sulphate 25g, Copper sulphate 1.5g. Potassium iodate 100mg. Vit A 800000IU, Vit D3 100,000IU, Riboflavin 400mg, folic acid 100mg, pyridoxine hydrochoride 500mg. Calcium pantothenate 1g, VitE 4g. Choline chloride 30g.

Table 2 Growth performance and carass yield of Japanese Quail in Deep litter and cage system of management

Parameter	Sex	Rearing System	
		Deep litter	Cage
Body weight at 2nd weeks of age	M	50.15 ± 3.10	49.87 ± 1.85
(gm)	F	52.48 ± 2.26	52.14 ± 1.11
Body weight at 8th weeks of age	M	203.15^{ap} ± 5.22	224.44^{bx} ± 4.12
(gm)	F	225.54^{aq} ± 5.28	248.10^{by} ± 7.05
ADG at 8 weeks of age (gm)	M	4.14 ± 0.65	4.58 ± .32
	F	4.60 ± 1.84	5.06 ± 2.29
Total Feed consumption upto 8 weeks	M	772.45 ± 4.30	768.87 ± 3.21
(gm/bird)	F	780.12 ± 2.32	774.63 ± 1.67
Feed conversion ratio at 8th weeks	M	3.78 ± 0.54	3.42 ± 0.28
	F	3.47 ± 1.04	3.12 ± 0.84
Body weight at 14th weeks of age (gm)	M	230.42^{ap} ± 5.09	246.23^{bx} ± 6.12
	F	293.11^{aq} ± 3.60	295.78^{by} ± 5.54
Carcass yield (gm at 8th weeks of age			
Carcass with skin (gm)	M	144.52^{ap} ± 2.13	166.18^{bx} ± 1.05
	F	141.98aq + 3.52	168.57^{by} ± 2.19
Thigh (gm)	M	20.15^{ap} ± 1.09	22.48^{bx} ± 0.95
	F	18.88ap + 1.67	18.12by + 1.43
Breast meat (gm)	M	55.79^{ap} ± 0.54	61.21^{bx} ± 1.06
	F	52.34^{ap} ± 0.82	58.56^{by} ± 0.68
Brumstick (gm)	M	15.07 + 1.14	15.90 ± 1.11
	F	14.94 ± 1.05	15.59 ± 0.75
Back (gm)	M	28.19 ± 0.66	34.27 ± 1.44
	F	27.84 ± 1.61	33.90 ± 1.03
Neck (gm)	M	5.75 ± 2.07	6.63 ± 1.24
	F	5.50 ± 0.56	6.60 ± 0.93
Wings (gm)	M	12.28 ± 1.43	12.10 ± 1.40
	F	12.20 ± 1.20	11.98 ± 1.00
Dressing percentage (%)	M	71.25ap ± 2.20	75.02bx ± 1.87
	F	66.53^{aq} ± 1.37	69.12^{by} ± 1.60

M = Male, **F** = Female
Means bearing different superscripts (a,b) in a row significantly (p, 0.01)
Means being different superscripts in column for a prarameter (p, q and x,y) differs significantly (p, 0.01)

Table 3 Laying perdormance/Egg quality of Japanese Quail in deep litter and cage system of management

Parameters	Deep litter	Cage
Age at 1st laying (days)	47.22 ± 0.05	47.20 ± 0.12
Egg number / hen	44.10^{a} ± 1.21	38.19^{b} ± 1.04
Percentage of laying	70.42^{a} ± 0.17	60.56^{b} ± 0.22
Egg weight / hen (gm)	13.47^{a} ± 0.31	12.05^{b} ± 0.15
Yolk index at 14th weeks (mm)	0.46 ± 0.02	0.43 ± 0.13
Albumen index at 14th weeks (mm)	0.13 ± 0.21	0.11 ± 0.07
Haugh unit	57.12 ± 0.04	57.44 ± 0.18
Shell thickness (mm)	0.21 ± 0.01	0.21 ± 0.11

Means bearing different superscripts in a row differ significantly ($p<0.01$)

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