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EFFECT OF VARYING FLOOR SPACE ON PRODUCTIVE PERFORMANCE OF JAPANESE QUAIL BREEDERS MAINTAINED UNDER LITTER FLOOR AND CAGE HOUSING SYSTEMS

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The experiment was conducted to study the effect of floor space on productive performance of 432 female and 216 male Japanese quail *(Coturnix coturnix Japonica)* breeders reared under litter floor and cage housing systems for a period of 10 weeks i.e. 13 to 22 weeks of age. Floor space was provided at the rate of 0.80, 0.67 and 0.57 ft21birdto the floor treatments A, B, C and 0.46, 0.38 and 0.33 ft21birdto the treatments D, E, F for cage-housed birds. Weight gain of male birds in cages (18.29 g) was significantly higher than those on litter floor (11.63 g), irrespective of floor space, whereas effect on females 'Wasnon-significant. Feed consumption and feed efficiency data showed a significant effect of both the variables Le. floor space and housing systems. Birds in medium (B and E) and lower (C and F) floor space consumed 13.72 and 15.42 % less feed per dozen eggs respectively as compared to those on higher (A and D) floor space. Egg production data showed non-significant effect of both the variables.

Key words: egg production, floor space, housing system, quail breeders

INTRODUCTION

Quails can be used for meat production at an early age (5-6 weeks) and as breeders after maturity. The birds can perform well only when the nutritional requirements are provided under ideal conditions. Body weight, feed consumption, egg production, and feed efficiency are affected by genetic make up as well as environmental variables such as nutrition and management. Although in chicken, cage housing improved weight gain (Oluyemi and Roberts, 1975; Sundaram et aI., 1979; Goher et aI., 1983) yet investigations revealed variable results of varying floor space on quail productivity. Increasing the bird number/cage or density had little effect on live weight gain (Connor and Burton, 1975; Ramakrishnaiah, 1977). Contrary to this, Hill and Hunt (1980); Ali et aI. (1991) found that birds kept at lower stocking density had a greater body weight than birds kept at a higher density.

Feed consumption was lower when caged hens were compared with hens on deep litter on per kg egg mass (Sundaram et aI., 1979) or per unit eggs (Oluyemi and Roberts, 1975; Antic et aI., 1985) produced basis. Stocking density in layers was inversely related with feed consumption (Teng et aI:, 1990), whereas feed conversion showed significant improvement with proportionate increase in cage space per layer in chicken (Akonov et aI:, 1979) or Japanese quails (Nagarajan et aI., 1991).

Egg production was lower when layers were housed in cages than on deep litter and free-range system (Pavlovski et aI., 1992). Increase in number of layers/cage or stocking density decreased egg production (Akonov et aI., 1979; Ouart, 1980; Teng et aI:, 1990; Ali et aI., 1991). Others found different results i.e. stocking density had no determinant effect on egg production (Reddy et aI., 1979; Halaj et aI:, 1988). Quail hen-day egg production showed significant improvement with proportionate increases in cage space per layer (Nagarajan et aI:, 1991). Accordingly, a study was planned to investigate the effect of varying floor space on the productivity of Japanese quails under local conditions.

MATERIALS AND METHODS

The experiment was conducted on 648 Japanese quail breeders kept under litter floor and cage housing systems for a period of 10 weeks Le. from 13 to 22 weeks of age at the Poultry Research Centre, University of Agriculture, Faisalabad. Of 648 experimental birds, 432 were females and 216 males. These were housed in the ratio of 1 male to 2 females in 9 pens on litter floor and 9 compartments in battery cages. The size of each pen and compartment being 24 and 13.75 ft2, respectively. The birds were randomly allotted to 18 experimental units, so that three such units were randomly ~ssigned to each of the six treatments under the two housing systems according to two factor completely randomized design. Litter material used on floor was sawdust, and each pen was covered with wire-gauze. Quails were kept at

the prevailing shed temperature and 15 hours of light per day was provided. The birds were fed *ad libitum* with a quail breeder ration formulated and prepared using NRC (1984) standards.

The birds were vaccinated against Newcastle disease through drinking water. Daily record of maximum and minimum temperature of the experimental room was also maintained. The following data were recorded for each experimental unit throughout the experimental period:

i. Body weight of the quails at fortnightly intervals for male and female birds separately
ii. Weekly feed consumption
iii. Daily egg production
iv. Mean weight gain, egg production on hen-day basis, and feed efficiency in terms of feed intake per dozen eggs was calculated from the above data
v. Mortality, if any

RESULTS AND DISCUSSION

Weight gain: The average weight gain of the male and female birds irrespective of the floor space and housing systems was 14.96 and 18.10 g respectively, with an overall gain of 16.53g on combined sex basis (Table 1). The male birds on an average gained 18.29 and 11.63 g and the female birds 18.71 and 17.48 g on the litter floor and in cage housing, respectively. Irrespective of sex the birds reared under floor system gained 27.06 % more weight than those reared under cage system. The average weight gain in males under floor system was 57.2 % more than males reared under cage system but the difference in females was minor i.e. 7.04 % more gain under floor system of housing. Apparently, the response of quails with respect to weight gain was better on the litter floor relative to the cage housing system as also reported by Heil, 1985; Pavlovski et al., 1992.

Analysis of variance of the data on weight gain revealed a significant effect of floor space and housing systems in the male, but non-significant effect in the female birds. Non-significant differences in weight gain in female birds with respect to stocking density in cages were also reported by Connor and Burton, 1975; Ramakrishnaiah, 1977. The comparison of means of weight gain in case of male birds by the DMR test revealed that the differences between groups provided more and less floor space, were significant ($P<0.05$). The weight gain of male birds was significantly higher ($P<0.05$) on the litter floor in comparison to those kept under the cage housing system.

Feed Consumption : The average feed consumption according to floor space allowances and housing systems of 648 breeder quails has been given in Table 2. It was, however, not possible to record the average feed consumption of male and female birds separately. The mean feed consumption under the litter floor and cage housing systems was 1937.48 and 1744.46 g, respectively. The birds on litter floor consumed 11.06 % more feed than those kept under the cage housing, and the feed consumption in case of different floor space groups under the former system was 11.25,8.84 and 13.12 % more compared to the respective space groups under the latter system.

Apparently, the floor space groups on the litter floor as well as in the cage housing system showed a decrease in feed consumption with decrease in the floor space. Statistical analysis of the data showed a significant effect of floor space and housing systems on feed consumption. The comparison of means showed that groups of birds provided more floor space, consumed significantly ($P<0.05$) more feed than those provided medium and lower floor space. The difference between the medium and lower space groups was, however, non-significant. The birds reared on litter floor consumed significantly ($P<0.05$). more feed than those reared under cage system. The mean feed consumption (27.69 g) of birds under cage housing in the present study was higher than that (24.0 and 21.16g) reported by Tiwari and Panda (1978) and Sachdev et al. (989). The difference in feed consumption may be due to the difference in the environmental conditions and cage space used in the two experiments.

Egg Production: Apparently the birds kept under cage system produced 4.30% more eggs than those kept under floor system of housing, whereas on the basis of space groups the production was 10.67, 2.19 and 0.33% more in cages compared to the respective groups on litter floor. However, the analysis of data indicated non-significant effect of floor space as well as the housing systems on egg production of quail breeders.

The values observed in this study are higher than those observed by Sachdev et al. (989) who indicated egg production range between 47.04 and 53.85 and attributed these differences to environmental conditions. These results, howev~, are not in agreement with those of Nagarajan et al. (1991), who reported a significant improvement in

Table 1. Mean values of weight gain (g) of Japanese quail breeders under litter floor and cage housing

	Type of housing	Treatment groups (floor space ft21bird)			Mean
	Litter floor (LF)	A(0.80)	BCO.67)	C(0.57)	
	Cages (C)	D(0,46)	E(0.38)	F(0.33)	
Male	LF	22.77	19.08	13.03	18.29"
	C	14.67	11.22	9.00	11.63[d]
	Mean	18.72"	15.15"b	11,01[b]	14.69
Female	LF	16.95	19.42	19.77	18.71
	C	17.84	20.25	14.70	17,48
	Mean	17.22	19.83	17.24	18.10
Sex combined	LF	19.86	19.25	16,40	18.50
	C	16.08	15.74	11.85	14.56
	Mean	17.97	17,49	17.13	16.53

Means with different letters show significant difference (P<0.05).

Table 2. Mean values of feed consumption, egg production, feed efficiency, and mortality of Japanese quail under litter floor and cage housing

Parameter	Type of housing	Treatment groups (floor space ft^2/bird)			Mean
	Litter floor (LF)	A(0.80)	B(0.67)	C(0.57)	
	Cages (C)	D(0,46)	E(0.38)	F(0.33)	
Feed consumption(g)	LF	2127.20	1867.00	1818.23	1937,48"
	C	1912.03	1715.33	1606.00	1744,46
	Mean	2019.62"	1791,17[b]	1712.12[b]	1840.97
Egg production (%)	LF	70.87	·75,49	73,46	73.27
	C	78,43	77.14	73.70	76,42
	Mean	74.65	76.32	73.58	74.85
Feed efficiency (g/12 eggs)	LF	574.32	473.52	462.36	503.40"
	C	466.60	424.60	418.08	436,43[d]
	Mean	520,46"	449.06[b]	440.22[b]	469.91
Mortality (%, female)	LF	0.00	2.78	0.00	0.93
	C	0.00	0.00	1,19	0.46
	Mean	0.00	1,39	0.60	0.69

Means with different letters show significant difference (P<0.05).

hen-day egg production with proportionate increase in cage space per quail layer.

Feed Efficiency: The cumulative feed efficiency of the six groups kept on varying floor space under litter floor and cage housing system in terms of feed intake per dozen eggs ranged from 418.08 to 574.32 g with an overall mean of 469.91g including the feed consumed by male birds. On the whole, the birds kept under cage system consumed 13.30% less feed per dozen eggs produced than those kept on litter floor system, Apparently, the feed consumed per dozen eggs declined with decrease in floor space on the litter floor as well as in cages. On average the quail groups provided medium and lower floor space

consumed 13.72 and 15.42% less feed per dozen eggs produced, respectively as compared to those provided higher space.

Analysis of variance of the data showed a significant effect of both the variables i.e. floor space and housing system on feed efficiency. The comparison of means further Tevealed that groups of birds provided medium and lower floor space consumed significantly less feed per dozen eggs compared to those provided higher floor space. The difference between the medium and lower space groups was, however, non-significant. The birds kept under the cage housing showed a significantly ($P< 0.05$) better feed efficiency than those kept on the litter floor. These results are in agreement with those of other workers regarding chicken (Sundaram et al., 1979; Antic et al., 1985).

Mortality : Three female quails died during the experimental period. There was, however, no mortality in the male birds. The mortality percentage was apparently higher in birds reared on litter floor than those reared in cage housing system. No clearcut reason could be assigned to this mortality after postmortem examination.

Conclusions : Keeping in view the overall performance of cage-housed birds, cage housing is recommended as a better system for keeping the adult Japanese quails, layers as well as breeders. More studies may, however, be carried out in order to determine the optimum floor space, and environmental conditions with respect to ideal productive performance and economics of quails under cage housing

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