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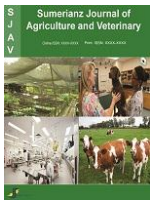

Original Article Open Access

Post-Hatch Performance of Quails Under Different Housing Environments in the Humid Tropics

Olawumi S.*
Department of Animal Production and Health Sciences, Ekiti State University P. M. B. 5363, Ado, Ekiti

Akinsola K.
Department of Animal Production and Health Sciences, Ekiti State University P. M. B. 5363, Ado, Ekiti

Abstract

The present study was conducted to assess the effect of two housing environments on the performance of quail chicks during the 21 day post-hatch period. A total number of 200 day-old quails of mixed sexes were sourced from local hatcheries and used for this study. On arrival, the chicks were separated into two housing systems, that is, 100 chicks each per cage and deep litter, respectively. Analyzed data showed that house has significant (P<0.01) effect on body weight, body weight gain and mortality rate of quail chicks. At 7-day post-hatch, quails brooded inside the cage had higher weight than their mates brooded on the concrete flood even though they were given uniform management conditions, feeding and temperature range to aid their growth and development. At 14-day post hatch also, cage birds had superior body weight than birds on deep litter. Similar result was recorded at 21-day post hatch body weight. With regard to body weight gain, in the period between 0-7 and 7-14 days, cage had superior mean values compared to floor system. It was observed that throughout the experimental period, quail chicks brooded in the cage had higher body weight and body weight gain than those brooded on the floor. In addition, higher deaths (P<0.01) were recorded in the floor system compared with cage. The obtained result showed that chicks in the cage utilized feeds given maximally to develop muscles and bone since their movement was restricted when compared with those on deep litter. In addition, birds in the cage had no contact with their faeces and therefore, less vulnerable to any contamination arising from ammonia burns oozing out from their faeces or any other pathogenic organisms. It is suggested therefore, that for maximum utilization of feeds and for better performance in terms of body weight and body weight gain, and lower mortality rate, quail chicks should be raised in the cage during the first few days after hatch.

Keywords: Coturnix quail; Cage; Deep litter; Mortality; Body weight.

1. Introduction

Japanese quail (*Coturnix coturnix japonica*) farming though at its infancy in this country is fast becoming more popular as a source of meat and eggs due to its shorter gestation and generation interval, rapid growth, high prolificacy, lower feed and space requirements. Japanese quails according to Coban, *et al.* [1] reach puberty at about 33 days of age and attain full adult function within 2-3 weeks, with females maturing slightly earlier than males. Globally, environmental factors such as feeding, management, ambient temperature, density and lighting regime had been implicated as major challenge to efficient and profitable poultry production. They affect production, health and general welfare of all poultry species [2-5]. Extensive studies had been carried out on housing system that is most suitable for efficient poultry production particularly in commercial layers. There are three basic types of housing or confinement for chickens and they are deep litter, slatted floor and battery cages [6], and these provide protection from physical hazards, rain and extremes of heat and cold [7]. Abdel-Rahman [8], reported that caged birds produced more (P<0.05) eggs than the floor hens and that the mortality rate was significantly lower in the former. The advantages of cage system over others include optimum use of land and labour, lesser incidence of feed wastages, reduced rate of egg eating and feather pecking and production of clean eggs. Similarly, Yakubu, *et al.* [9] reported that caged birds performed better (P<0.05) in hen-housed egg production, egg weight and mortality rate than floor birds. In the same vein, Muthusamy and Viswanathan [10] and Ayorinde, *et al.* [11] reported the superiority of cage birds in terms of egg production, while the latter authors also found added that cage birds had significantly higher feed efficiency, egg weight and lower mortality rate when compared to deep litter system. In contrast, Akinokun and Benyi [12] and Olawumi and Dudusola [13] found non-significant effect of housing on egg production, egg weight, feed efficiency, shell thickness and livability but that housing affected the body weight of the birds. Confinement of birds or space restriction is now a contentious issue in some developed nations. This is in contrast to what obtains in the developing countries where the quest for battery cage is on the increase due to the aforementioned advantages of cage system over others. Moreover, floor eggs when in contact with the faeces according to Souza, *et al.* [14] are contaminated by the bacterial which entered through egg pores thereby lowering the quality of floor eggs. There is dearth of information on the type of housing system appropriate for efficient and profitable quail performance, especially at the brooding stage. The present study was undertaken to determine the effect of housing system on body weight, body weight gain and survivability of quail chicks during brooding period which lasted 21 days.

*Corresponding Author

2. Materials and Methods

The study was carried out at the Animal Breeding Unit, Teaching and Research Farm, Ekiti State University, Ado-Ekiti, between August, 2013 and September, 2013. Ado-Ekiti is situated along latitude $7^0 31^1$ and $7^0 49^1$ North of the Equator and longitude $5^0 71^1$and $5^0 27^1$East of the Greenwich Meridian. The city falls under Derived Savannah zone. The city enjoys two separate seasonal periods namely, Rainy (May-October) and Dry (November-April) seasons.

2.1. Management and Experimental Birds

A total number of 200 day-old quails of mixed sexes were sourced from local hatcheries and used for this study. On arrival, the chicks were separated into two housing systems, that is, cage and deep litter. The cage was made of wire net on the four sides and bottom, while the top was roofed with solid slate material. In addition, the cage was well covered with nylon material to conserve heat. Similarly, the floor type was guarded on the four sides with wire net, but the floor itself was made of concrete and covered with wood shavings and nylon materials on both sides to conserve heat. They were brooded using coal pot to supply heat for the first three weeks of life. Antibiotics and vitamins were administered as and when due. Their beddings are made up of dry wood shavings to prevent coccidiosis outbreak and high level of hygiene was maintained throughout the experimental period to ensure unhindered conducive environment for growth and to lower death rate.

The birds were raised under same nutritional status and uniform management and environmental conditions. They were of the same age and were given chicks mash from 1^{st} -21^{st} day of life containing 21%CP and 3000 Kcal/kg ME. They unrestricted access to water during the brooding period.

2.2. Data Collection

The chicks were weighed on arrival and intervals of 7 days thereafter. Also mortalities recorded were registered separately for each housing system till 4^{th} week which marked the end of brooding period. In addition, body weight gain was calculated by subtracting the previous week's body weights taken from the current week's body weights on chick basis and for individual housing system.

Thirty (30) birds per housing were taken at random for weighing after being starved overnight from the pens. All the birds were weighed using sensitive top loading scale (gm).

2.3. Statistical Analysis

Data collected were subjected to T-test to determine the effect of housing system on the performance of quail chicks per SAS [15].

The appropriate statistical model used is:

$Y_{ij} = \mu + H_j + \varepsilon_{ij}$

Y_{ij}= observation of the k^{th} population, of the $_j^{th}$ house

μ= common mean

H_j = fixed effect of $_j^{th}$ house (i=2)

ε_{ij}= random error

3. Results and Discussion

The least squares means showing the effect of housing system on the performance of quail chicks during 21-day brooding period was given in Table 1. There was significant (P<0.01) effect of housing system on the body weight during the observed period. At 7-day post hatch, quails brooded inside the cage had higher live body weight than their mates brooded on the concrete flood even though they were given uniform management conditions, feeding and temperature range to aid their growth and development. At 14-day post hatch also, cage birds had superior body weight than birds on deep litter. The difference was 15.57g in favour of cage birds. Similar result was recorded at 21-day post hatch body weight. The difference was 17.29g in favour of cage birds. It was observed that throughout the experimental period, quail chicks brooded in the cage had higher body weight than those brooded on the floor. This might not be unconnected to the fact that chicks in the cage utilized feeds given maximally to develop muscles and bone since their movement was restricted when compared with those on deep litter. In addition, birds in the cage had no contact with their faeces and therefore, less vulnerable to any contamination arising from ammonia burns oozing out from their faeces or any other pathogenic organisms. Any contamination arising from contact with faeces may result to respiratory infection thereby causing some negative impact on feed intake, digestion and growth pattern. The environment in the cage appeared conducive and thus aided their faster growth when compared with those on the concrete floor. The result of the present study was in agreement with Akinokun and Benyi [12] who found that birds reared in the cage had higher body weight than those on the floor.

Table-1. Least squares means showing housing effect on body weight (g) of coturnix quails (0, 7, 14, 21d)

House	Body weight (g)			
	0d	**7d**	**14d**	**21d**
Cage	9.53^a	29.60^a	52.43^a	70.50^a
Floor	6.21^b	21.10^b	36.86^b	53.21^b
SE	0.31	0.76	1.22	1.89

ab means along columns with different superscripts are significantly different (P<0.01)

In Table 2, it was shown that housing system has significant (P<0.01) effect on body weight gain of quail chicks during the brooding period. In the period between 0-7 and 7-14 days, cage had superior mean values compared to floor system. The differences were 5.1g and 7.14g respectively, for the two age groups and were in favour of cage birds. It can be inferred from this study that birds brooded in the cage gained weight more than those on the floor. This might be due to the fact that birds in the cage had their movement restricted and therefore, utilized efficiently the feeds given to develop muscle and bone, while those on the floor probably used the energy derived from the feeds given to run around and gained lesser weight as a result. It is suggested therefore, that for maximum utilization of feeds and for better performance in terms of body weight and body weight gain, quail chicks be raised in the cage during the first few days after hatch. This has two-fold advantages. First, it will help minimize contact with faeces and odour which may aggravate whatever infections already in the environment. Secondly, the heat supplied will be conserved and distributed evenly to aid growth and development of the chicks. Day-old chicks of all avian species need adequate care, heat and conducive environment during the first few days of live, and any exposure to draught or inadequate heat may lead to sickness, poor feed conversion, poor growth rate and death.

Table 2 also presents the mean values for mortality as recorded for each of the two housing units. Higher deaths (P<0.01) were recorded in the floor system compared with cage. The higher mortality recorded with floor birds might be due to infections arising from having contact with their faeces. However, further investigation is required to be carried out in order to identify the pathogens responsible for mortalities in early days of chicks. The result of this study was in line with the observations of Souza, *et al.* [14] who reported that eggs that were laid on the floor were infected with bacterial due to their contact with faeces. The present data also confirmed the findings of Ayorinde, *et al.* [11] and Yakubu, *et al.* [9] who documented that cage birds performed better in term of mortality rate. Another contributory factor to poor performance of chicks brooded on the floor was unrestricted movement given to them. Since they moved around freely, the energy derived from the feeds consumed which could been used for muscle growth and development was probably spent on such exercises. It is therefore, good that chicks be raised on housing system that minimizes physical contact with their droppings to reduce mortality and for faster growth.

Table-2. Least squares means showing housing effect on body weight gain (g) and mortality of Coturnix quails (0-21d)

House	Body weight gain (g)			Mortality (0-21d)
	0-7d	7-14d	14-21d	
Cage	20.07[a]	22.83[a]	18.07	0.33±0.16
Floor	14.97[b]	15.69[b]	19.10	1.44±0.62
SE	0.82	1.44	1.86	

ab means along columns with different superscripts are significantly different (P<0.01)

4. Conclusions

It can be deduced from the findings of this study that cage system of brooding quail chicks is better, efficient, convenient and enhances the growth of birds during the first few days of live. Both body weight and body weight gain of birds raised in the cage were higher than those on the floor. In addition, survivability rate was better with cage system than the floor.

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