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Full Length Article

Influence of Housing Systems on the Performance and Reproductive Characteristics of Wearner Rabbits Reared in Port Harcourt, Rivers State, Nigeria

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ABSTRACT

A study was conducted to evaluate the performance of rabbits reared under three different housing systems; (a) conventional housing system (hutch, control), (b) non conventional housing system (deep litter system) and (c) another non conventional system (bare mud floor). The two non-conventional systems were adopted to conform to methods currently employed by ordinary peasants. The study lasted 28 weeks. A total number of 30 adult rabbits of the medium sized breed category of both sexes aged 5-6 months were assigned randomly to the groups:- A (control: cage system), B (deep litter-cemented floor) C (bare floor) each group comprising 7 females and 3 males. Several observations were made including conception rate, litter size, weight gain etc. Results obtained from the production parameters indicated a higher conception rate in group C (70.63%) over and above the cage system (49.00%) and the deep litter system (60.34%). The mean litter size, kindling rate and average number of animals weaned were also significantly different ($P<0.05$) in favor of the non-conventional housing systems. There was a significant difference in the age and weight at puberty, mean age between rabbits in the three different systems. Percentage pseudo-pregnancy was higher in the conventional housing system than in the non-conventional housing systems. Adult and litter mortality was higher in the conventional housing system than in the non-conventional housing systems, (cage 15%), deep litter 10% and bare mud floor 5%. Results of the production parameters showed significant difference in body weight ($P<0.05$) among rabbits reared under the three systems. For instance, average total weight gain was significantly higher ($P<0.05$) in the rabbits in floor system (0.68 kg) as against rabbits placed on deep litter system (0.52 kg) and that of cage system (0.59 kg). Comparative analysis of the production/reproduction parameters vis-â-vis production cost in the 3 groups favoured the non-conventional housing system (bare floor), which is cost effective in terms of production and also guarantees lower mortality and higher production.

Key Words: Rabbit housing; Production parameters; Rabbit reproduction

INTRODUCTION

In recent years there have been several technical advances in livestock production in Nigeria. However, most of these advances have failed to satisfy the basic needs of rural people to secure feed supplies particularly sources of animal protein (Owen *et al*., 2008a). As a result the needs for self reliance in food production are absolutely critical not only at the national level but also at the family level. It is therefore, necessary to avert the crisis in animal protein supply by redirecting emphasis on livestock production especially those animals with short reproductive cycles such as rabbits.

Rabbit keeping has gained prominence in the Nigerian society. This is mainly due to the relatively cheaper maintenance cost especially in the area of their feeding, which consists mainly of forages and kitchen waste. Rabbits are very prolific (producing at least 4-5 L per annum/doe under the traditional management system). This is made even more possible as its gestation period is very short (30-32days) (Aduku & Olukosi, 1990). The high turn-over of offspring per year easily offsets the cost of maintaining the doe quite unlike in the other livestock species. Also the cost of housing, equipment and feeding is relatively low. The starting cost of a home-made hutch of wooden frame and bamboo is less than ₦1, 800 (Owen *et al.*, 2008b).

Rabbit production in Nigeria is largely carried out in cages and mainly iron frame cages. The objective of this study was to evaluate the effects of different housing systems on the performance and reproductive characteristics of rabbits.

MATERIALS AND METHODS

The research was carried out at the Rivers State Agricultural Development Programme (ADP) Farm

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Rumuodomaya, Port Harcourt, Nigeria.

Thirty 5-6 months old adult rabbits of different sexes (9 males & 21 females) comprising Chinchilla, New Zealand White and Dutch all crosses of hybrids were used in the study. The animals were assigned randomly to three groups; A (control), B (treatment) and C (treatment), each group comprising 7 females and 3 males in a Completely Randomized Design (CRD).

Group (A) comprising 10 rabbits, which served as the control group, were housed in bamboo made cages. These cages were housed in a building with concrete floor designed to allow ventilation (half wall & the rest was covered with wire mesh). Group (B) comprising of 10 rabbits served as the first treatment and was placed on a deep litter concrete floor. Wood shaving was used as the deep litter material and the depth of the litter was about 3 inch. Group C comprising 10 rabbits which served as the second treatment was placed on a non-concrete floor to encourage burrowing.

The animals were allowed two weeks pre-conditioning period. They were medicated against common diseases like mange, coccidiosis etc. Standard sanitary condition such as daily washing of feeders drinkers, trays were maintained in all the systems. All the animals were subjected to similar management/husbandry conditions of feeding and hygiene except the housing system. All the animals were fed 50 g of poultry grower's mash and forages (ad libitum) such as *Panicum maximum* (grass); *centrosema pubesccns* and *Caloponium nucanoides* (legumes).

Feed consumption, weekly body weight, conception rate, gestation length, kindling rate and litter size were monitored. The study was carried out from March to October 2009, which was between the wet and dry seasons. The study lasted 28 weeks. The data collected were subjected to Analysis of Variance (ANOVA) according to Steel and Torrie (1980) and Means were partitioned where necessary using Duncan's New Multiple Range Test (DNMRT) as outlined by Obi (1990).

RESULTS

The productive performance of rabbits reared under the three different housing systems are presented in Table I. Significant differences in body weight ($P<0.05$) existed among rabbits reared under the three systems. For instance average weight gain was significantly higher ($P<0.05$) in rabbits under the floor system (0.68 kg) as against rabbits placed on deep litter system (0.52 kg) and that of cage system (0.59 kg). The average feed intake was significantly higher ($P<0:05$) in rabbits placed under the cage system (0.76 kg) over those placed under deep litter and floor systems (0.73 & 0.74 kg), respectively.

With respect to the feed efficiency, the floor system was significantly higher ($P<0.05$) than the other systems. Also, the floor system recorded significantly ($P<0.05$) higher average final weight above the other two systems.

Table I: Productive parameters of rabbits reared under three different housing systems

Parameter	CS	DL	FS
Av. unit wt (kg)	1.35 ± 0.15	1.42 ± 0.23	1.43 ± 0.12
Av. total feed intake (kg)	$0.76^{a} \pm 2.52$	$0.73^{b} \pm 5.00$	$0.74^{b} \pm 2.65$
Av. total wt gain (kg)	$0.59^{b} \pm 0.11$	$0.52^{b} \pm 0.16$	$0.68^{a} \pm 0.12$
Av. final wt (kg)	$1.94^{b} \pm 0.07$	$1.94^{b} \pm 0.09$	$2.11^{a} \pm 0.11$
Feed efficiency (gain/feed)	$0.79^{b} \pm 0.04$	$0.71^{b} \pm 0.02$	$0.92^{a} \pm 0.05$

ab means in the same row for each parameter with different superscripts are significantly different ($P<0.05$)
CS – Cage System, DL – Deep litter FS – Floor System±

Table II: Reproductive performance of rabbits reared under three different housing systems

Parameters	CS	DL	FS
Conception rate(unit no)	$49.00^{b} \pm 0.33$	$60.34^{ab} \pm 0.45$	$70.63^{a} \pm 0.50$
Kindling rate (%)	$42.60^{b} \pm 0.10$	$65.95^{ab} \pm 0.10$	$80^{a} \pm 0.45$
Gestation (days)	30	30 ± 0.20	30
No. of kittens	$20^{c} \pm 0.18$	$35^{b} \pm 0.15$	$45^{a} \pm 0.34$
Mortality (unit no)	$15^{a} \pm 0.25$	$10^{b} \pm 0.22$	5^{c}
Pseudo-pregnancy(unit no)	51.00^{a}	$39.66^{b} \pm 0.20$	$19.50^{c} \pm 0.25$
Weaning wt. (g)	$300^{b} \pm 0.20$	$400^{ab} \pm 0.45$	$500^{a} \pm 0.30$
Production cost (₦)	₦37,000	₦35,000	₦33,000

ab, means within the same row with the same superscript are not significantly different ($P>0.05$)

The effect of the treatment on reproductive performance of the does is shown in Table II. The floor system recorded the highest ($P < 0.5$) conception rate (70.63%) over and above the cage and the cage system. There was no significant difference ($P > 0.05$) in the conception rate between the deep litter system and cage system. Meanwhile, the cage system had the highest ($P < 0.05$) rate of pseudo pregnancy (51.00%), followed by that of the deep litter system (39.66%), while the floor systems recorded the least percent incidence (19.50%) of pseudo pregnancy. There was no treatment effect on the average gestation length as all the groups had the same average gestation length of 30 days.

The floor system had the highest kindling rate (80%), which was significantly ($P < 0.05$) higher than that of cage system (42.60%) but not that of the deep litter system (65.95%). The floor system recorded the highest total number of kittens ($P < 0.05$), followed by the deep litter system, whilst the cage system had the least number of kittens. Similarly the floor system also recorded an average weaning weight that was significantly higher than that of cage system but not significantly higher than that of the deep litter system. The cage system had the highest number of mortality, which was significantly ($P<0.05$) higher than the deep litter and floor systems.

DISCUSSION

In the pasts attention seems to have been paid to the possible influence of housing systems on the productive and reproductive performance of rabbits. In the present study, the rabbits kept under cage system recorded the highest feed

intake but lower feed conversion compared to the floor system. This may be due partly to physical response of the rabbits to heat stress associated with cage system, which may result in feed wastage (Berepubo *et al.,* 1996; Owen, *et al.,* 2008a, b) and partly due to physiologically depressed metabolism. It is known that rabbits hide in burrows during the cooler hours of night to dawn. This might not be unconnected to the highest feed conversion observed in this study among the rabbits placed on the floor system, which simulates the natural conditions and encourage caecotrophy that it practiced at night and in burrows during the day (Fielding, 1991). Bagliacca *et al.* (1987) suggested that this environment, which enables the rabbits to exercise their potential to the fullest can be provided in the floor system, where the rabbit digs its burrow creating room for good performance. This freedom is not given to the rabbit in cages and as such their natural instincts and attributes are not enhanced. Rastimeshin (1980) also stated that the floor system with underground burrowing keeps the rabbit safe from predators and heat by instinctively utilizing the cooling effect of the earth. The rabbits placed on deep litter recorded lower feed intake, total weight gain and feed conversion respectively than those on floor system. It is possible that they consumed some of their litter, which reduced the quantity of feed consumed and consequently weight gain. This observation is coherent with the higher feed conversion among rabbits on litter as recorded by Drescher (1990).

Significantly higher conception rate and number of kittens observed among those placed on bare mud floor and deep litter systems against the cage system could be attributed to the heat stress associated with cage system (Finzi *et al.,* 1988), which impairs fertility and cause low litter size, while the floor system stimulated natural environment that enabled the rabbit to exhibit its potential to the fullest (Bagliacca *et al.,* 1987; Finzi & Amici, 1991) and keep the rabbits safe from heat (Rastimeshin, 1980).

The highest pseudo-pregnancy observed in caged rabbits is the result of induced false pregnancy as rabbits are induced ovulators rather than spontaneous ovulations. On the other hand, the pseudo-pregnancy among those on deep litter and floor system may not have been observed due to indiscriminate mating associated with these housing systems. The high mortality recorded among the caged rabbits may not be unconnected with heat stress associated with this system as was also reported by Blume *et al*. (1976) and Owen *et al.* (2008a, b). Consequently, the weaning weight of the kittens corresponded with the performance of their does, which is attributed to the housing systems. Though with the higher performance the floor and deep litter systems may be adopted for commercial fryer production and not for a controlled breeding research.

In conclusion, this study seem to favor the use of floor or deep litter systems for the fact that they give room for the free manifestation of natural rabbit biology. For instance the caged rabbits recorded the least number of kittens but highest mortality, since most natural traits manifested by the rabbits on the floor or deep litter system were absent in the cage system. Rabbits reared on floor system gained more weight, higher conception and kindling rates with the largest number of kittens but recorded least mortality. It is possible that a more reliable trend could be obtained in a larger sample size of study. Meanwhile, the floor system of rabbit production needs to be subjected to further studies with emphasis on the associated diseases before recommendation for large-scale adoption.

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