

CARCASS CHARACTERISTICS OF RABBITS AS AFFECTED BY DIFFERENT HOUSING TYPES IN THE TROPICS

¹*Iyanda, A.I., ²Iposu, S.O., ²Sogunle, O.M., ³Bello, K.O., ¹Ogunsola, O.D. and ⁴Ilori, B.M.,
⁴Durosaro S.O

¹Directorate of University Farms, ²Department of Animal Production and Health, ³Institute of Food Security, Environmental Resources and Agricultural Research, ⁴Department of Animal Breeding and Genetics.

Federal University of Agriculture, Abeokuta, P. M.B. 2240, Abeokuta, Ogun State, Nigeria.

*Corresponding author: iyandaade@yahoo.com

Abstract

A study that lasted for 90 days was conducted to evaluate the effects of housing systems (wooden hutch, metal hutch and deep litter) on the growth performance and carcass characteristics of crosses between Chinchilla X New Zealand White unsex growing rabbits ($n = 189$) in a Completely Randomized Design. The dimensions of the hutches (both the wooden and metal hutches) used were 210cm x 170cm x 120cm and the demarcation for deep litter followed the same dimensions. Results showed that significantly ($P < 0.05$) higher dressing percentage ($57.42 \pm 0.970\%$), neck ($2.45 \pm 0.060\%$) and trotters ($2.53 \pm 0.090\%$) were observed among the rabbits in wooden hutch when compared with its counterpart. Significantly ($P < 0.05$) higher kidney percentage ($0.88 \pm 0.060\%$) was recorded for rabbits on deep litter system. The rabbits raised on deep litter had significantly ($P < 0.05$) higher kidney percentage.

Key words: Carcass characteristics, wooden hutch, metal hutch, deep litter.

Introduction

The design of rabbit housing is governed by the behavioural characteristics of the animal and their reaction to environmental temperature and humidity (Gonzalez *et al.*, 1971). Some behaviour such as territorial, social, sexual, maternal and feeding behaviour which directly or indirectly affect the general performance of the rabbit has influenced the housing design and caging (Fort and Martin, 1981). Das *et al.* (2002) reported that housing systems alter micro-environment which ultimately may influence rabbits' performance. A number of alternative housing systems have been reported in different literatures; the pit system, consisting of underground cells, has been described by Finzi (2000), which has been recommended for rabbit rearing in hot climates, such as in the Sahara region. Aubert and Duperray (1992) also reported that housing, floor space and season have significant influence on the feed intake and growth of any livestock species. So it is expected that these factors may affect the carcass traits and composition. Housing systems in floor pens or colony cages seem to reduce stress and aggressive behaviour of the animals (Maertens and Van Qerckel, 2001). However, mortality rate is increased while growth rate, feed intake, feed

efficiency, dressing percentage and meat quality decreased as reported by Lambertini *et al.* (2001). Rabbits have been managed on different types of housing in the tropics but with no comparison of this housing to deduce which one maximizes carcass yield. Hence, this study sought to evaluate the effects of housing types on the carcass characteristics of crosses between Chinchilla X New Zealand white unsex growing rabbits.

Materials and Methods

The research was carried out in the Rabbit unit of the Teaching and Research Farms, Federal University of Agriculture, Alabata, Abeokuta, Ogun State, Nigeria. The state is situated in the South-western part of Nigeria which is a derived savanna zone with an annual mean temperature of 43.70°C and a relative humidity of 82%. It is in the region 70m above sea level of latitude $7^{\circ}5'-7^{\circ}8'N$ and longitude $3^{\circ}11.2'E$.

The study was conducted using one hundred and eighty nine (189), 8-weeks growing rabbits, purchased from a reputable commercial rabbits farm and the rabbits were randomly divided on weight equalization into three (3) treatments (housing types) having groups of sixty-three (63) rabbits each. Each treatment group was replicated three times consisting of twenty-one (21) rabbits per replicate. The hutches (both wooden and metal) and the deep litter system have the following dimension; length, 210cm; width,

170cm and height, 120cm with three (3) rabbits per 210 X 170 X 120 (cm³). Wire mesh floor were used for proper elimination of urine and faeces and for allowance of ventilation. The hutches were placed inside a walled house built with concrete block and covered with corrugated roofing sheet. The dimensions and demarcation on the floor for deep litter also follow the same dimensions with the hutches and are also placed under a roofed house. Each experimental rabbits were provided with 100g of feed containing about 17% crude protein daily and water was supplied to the rabbits *ad libitum*. Forages such as *Tridax procumbens* and/or *Aspillia africana* were also provided as a supplement throughout the experimental period of twelve (12) weeks. Feed consumption of each replicate was kept on weekly basis so as to determine the average daily feed intake per rabbit. Live-weight of the rabbits was also taken weekly to measure weekly weight gain. On the last day of the experiment, fifteen (15) rabbits per replicate were taken for carcass evaluation. The rabbits were starved for 12 hours prior to slaughter, weighed, stunned, slaughtered by neck slit, properly bled, scalded using naked fire and eviscerated. The slaughtering, evisceration and carcass partitioning were done using the procedures described by Awosanya (1988). The weight of the cut-up parts, viz; hind and fore limbs, rack, loin, neck and trotters were measured using Mettler top-loading sensitive scale. The weights of the liver, kidney, heart and lung were also determined using electronic scale. The dressed weight and hot carcass weight were determined. The dressing percentage was calculated by multiplying the quotient of dressed weight and live weight by 100. All data collected were subjected to Analysis of Variance (ANOVA) in a Completely Randomized Design. Significantly, ($P < 0.05$) different means were separated using Duncan's Multiple Range Test as contained in the Statistical Analysts Software (SAS®, Littell *et al.*, 2002).

The model used is as follows:

$u_{ij} = \mu + T_i + \varepsilon_{ij}$ where: u_{ij} = Observed value, μ = Overall mean value, T_i = Random effect of the i^{th} housing types, ε_{ij} = Random residual error

Results and Discussion

The bled, shrunk body and hot carcass values expressed as percentages of the live weight (Table 1) were not significantly ($P > 0.05$) affected by the housing types. The highest values of $96.70 \pm 0.890\%$, $91.23 \pm 0.830\%$ and $63.81 \pm 0.590\%$ were recorded for rabbits in wooden hutch for

bled, shrunk body and hot carcass while the rabbit on deep litter recorded the lowest values of $91.22 \pm 2.140\%$, $83.66 \pm 4.370\%$ and $57.65 \pm 3.020\%$ for bled, shrunk body and hot carcass, respectively. There were no marked ($P > 0.05$) differences observed for all the cut parts measured (Table 2) except the neck and the trotters which are significantly ($P < 0.05$) influenced by the housing types. The values obtained for neck ranged from $1.35 \pm 0.080\%$ (Deep litter) to $2.45 \pm 0.060\%$ (wooden hutch) while the values for the trotters ranged from $1.98 \pm 0.050\%$ (metal hutch) to $2.53 \pm 0.090\%$ (wooden hutch). Fore Limb value ranged from $8.17 \pm 0.490\%$ (Deep litter) to $9.21 \pm 0.220\%$ (wooden hutch), the hind limbs, loin, rack and trotters followed the same trend in which the rabbit on wooden hutch recorded the highest values of 16.48 ± 0.180 , 12.49 ± 0.260 , 11.06 ± 0.11 and $2.53 \pm 0.09\%$, respectively while the lowest values observed for rabbits on metal hutches recorded the lowest values of 14.30 ± 2.070 , 9.30 ± 1.440 , 10.15 ± 1.820 and $1.98 \pm 0.050\%$, accordingly. The internal organs measured (Table 3) were not significantly ($P > 0.05$) influenced by the housing systems except in the kidneys. The values obtained for heart ranged from $0.26 \pm 0.020\%$ in deep litter to $0.30 \pm 0.010\%$ in wooden hutch; the lungs ranged from $0.53 \pm 0.040\%$ in deep litter to $0.59 \pm 0.070\%$ in wooden hutch. The values obtained for liver also ranged from $3.19 \pm 0.150\%$ in deep litter to $3.28 \pm 0.240\%$ in wooden hutch while the spleen ranged from $0.07 \pm 0.000\%$ in wooden hutch to $0.10 \pm 0.020\%$ in metal hutch. The effect of housing type on the dressing percentage of slaughter and percentage weight of body cut parts on live-weight basis gave numerically higher values for rabbits in wooden hutch. The range of value of 57.56 ± 3.020 to $63.81 \pm 0.590\%$ obtained for hot carcass percentage fell within the range estimated by Dalle Zotte (2000) that a good rabbit must give a hot carcass yield of 55 to 64%. The range ($83.66 \pm 4.370 - 91.23 \pm 0.830\%$) observed in this study for shrunk body percentage was slightly higher than the range ($80.42 - 86.26\%$) reported by Fayeye and Ayorinde (2008) and then revealed that prolonged starvation of rabbits prior to slaughter reduces shrunk body weight and dressing percentage. Hinner (1962) reported a dressing percentage ranges from 50.7 to 58.8% depending on the grades of the carcass while USDA (1973) indicated a carcass yield of 56% thereby supporting the findings of this research. The range observed for forelimb, hind limb and rack were slightly lower to the range observed by Rao *et al.* (1976) who reported that the percentages of the cut-parts of rabbits depended on the age at

which the rabbit is slaughtered. Moreover, the values for loin observed across the treatments groups fall within the range reported by Fayeye and Ayorinde (2008) when the carcass traits of male and female rabbit kept on different housing systems were compared. The highest values of neck and trotters indicated by rabbits on wooden hutch could be as a result of the increased physical exercise exhibited during the experiment. Mc Nitt *et al.* (2003) reported that locomotors activity plays a vital role in the development of the muscular parts of rabbit. The range of values for heart, lungs, liver and spleen reported in this study are very low, this could be as a result of the lower age weight of the rabbits slaughtered, though these results are similar to the range reported by Pascual and Pla (2007). However, Pinheiro *et al.* (2008) observed 0.34 - 0.42%, 1.87 - 1.94%, 6.26 - 6.74% and 0.10 - 0.13% for heart, lungs, liver and spleen, respectively for rabbits kept on different housing systems which are higher when compared with the range observed in this study. Hence, it is known that growth rate and age affects the development of specific tissues and organ. The kidney is statistically influenced by the housing types with lower values when compared with 1.11% - 1.13% reported by Pinheiro *et al.* (2008).

Conclusion

This study revealed that the percentages of the valuable cut parts (head, neck, forelimb, hind limb, loin and rack) of rabbits raised in wooden hutch indicated the best when compared to its counterpart. However, the treatment had no effect on the weight of organs measured except the kidney that was significantly influenced.

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Table 1: Killing-out percentage of rabbits on different housing types (15 rabbits/replicate)

Parameters	Housing types		
	Wooden hutch ± SE	Metal hutch ± SE	Deep litter ± SE
Average liveweight (g)	1265.70 ± 12.770	1344.3 ± 128.640	1260.7 ± 35.750
Bled	96.70 ± 0.890	93.59 ± 6.780	91.22 ± 2.140
Shrunk Body	91.23 ± 0.830	84.75 ± 6.490	83.66 ± 4.370
Hot Carcass	63.81 ± 0.590	58.02 ± 7.520	57.65 ± 3.020
Dressing	57.42 ^a ± 0.970	50.57 ^{ab} ± 4.820	44.07 ^b ± 2.500

^{a,b} means on the same row having different superscript are significantly different (P<0.05)

Table 2: Percentage Cut-part of rabbits on different housing types (15 rabbits/replicate)

Parameters	Housing types		
	Wooden hutch ± SE	Metal hutch ± SE	Deep litter ± SE
Average liveweight (g)	1265.70 ± 12.770	1344.3 ± 128.640	1260.7 ± 35.750
Head	8.85 ± 0.320	8.02 ± 0.530	8.04 ± 0.240
Neck	2.45 ^a ± 0.060	1.75 ^b ± 0.200	1.35 ^b ± 0.080
Fore Limbs	9.21 ± 0.220	8.22 ± 1.200	8.17 ± 0.490
Hind Limbs	16.48 ± 0.180	14.30 ± 2.070	15.23 ± 1.040
Loin	12.49 ± 0.260	9.30 ± 1.440	9.49 ± 1.430
Tail	4.03 ± 0.160	4.59 ± 0.550	4.02 ± 1.120
Rack	11.06 ± 0.110	10.15 ± 1.820	10.40 ± 0.350
Trotters	2.53 ^a ± 0.090	1.98 ^b ± 0.050	2.34 ^a ± 0.080

^{a,b} means on the same row having different superscript are significantly different (P<0.05)

Table 3: Organs percentage of rabbits on different housing types (15 rabbits/replicate)

Parameters	Housing types		
	Wooden hutch ± SE	Metal hutch ± SE	Deep litter ± SE
Average liveweight (g)	1265.70 ± 12.770	1344.30 ± 128.640	1260.70 ± 35.750
Heart	0.30 ± 0.010	0.29 ± 0.010	0.26 ± 0.020
Lungs	0.59 ± 0.070	0.56 ± 0.060	0.53 ± 0.040
Kidneys	0.67 ^b ± 0.020	0.86 ^{ab} ± 0.070	0.88 ^a ± 0.060
Liver	3.28 ± 0.240	3.34 ± 0.120	3.19 ± 0.150
Spleen	0.07 ± 0.000	0.10 ± 0.020	0.08 ± 0.020

^{a,b} means on the same row having different superscript are significantly different (P<0.05)