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PERFORMANCE OF NEW ZEALAND RABBITS RAISED IN STEEL AND WOODEN HUTCHES IN THE HUMID TROPIC OF SOUTHERN NIGERIA.

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ABSTRACT

This study was conducted to evaluate the performance of rabbits raised in steel and wooden hutches. Data on body weight and feed intake of 24 New Zealand does offspring were collected between September 2018 and May 2019 at the university of Benin farm. Data collected were subjected to t-test and economy of feed conversion analysis. Results obtained shows that rabbits in wooden hutches had higher weights in the 25 and 75% percentile. The coefficient of determination range from 88.8 to 95.8% and 43.00 to 47.9% in the wooden and steel hutches. The body weight of the rabbits in wooden hutches were better predicted using the quadratic function that best explain the variance in their body weight (95.8%) and logistic function for steel hutches. Feed intake of 6,249 and 6,420.1g and feed conversion ratio of 5.66 and 6.17 were obtained for wooden and steel hutches respectively. Wooden hutches were better in raising the rabbits in this environment considering the climatic condition and scale of production.

Key words: rabbit, performance, steel, wooden, hutches

INTRODUCTION

Efficient production systems of rabbits can turn 20 percent of the proteins they consumed into edible meat. Housing systems of rabbits have been reported to affect body weight, growth, mortality and behavior (Chu *et al.* 2004). From the past decade onward, the consumers are interested in obtaining high-quality products from animals reared and kept under a high-welfare environment. The well-being of the rabbits is affected by the hutch type because the rabbits spend most of their time resting on the floor of the hutch. Szendrő and Luzi, (2006) and Verga *et al.*, (2006) stated that the hutch type is one of the most important factors determining animal performance and their welfare. Owen *et al.* (2008) observed that the replacement of wire hutch with bamboo led to better performance of rabbits in bamboo with a feed conversion ratio of 0.92 as against those in steel hutches which had 1.08. Rabbit production in a humid tropical environment are affected by climatic and environmental conditions as such hutch type becomes an important consideration for effective production in the humid tropics. On this premise, the study was undertaken to evaluate the performance of rabbits raised in wooden and steel hutches in the humid tropical environment.

MATERIALS AND METHODS

Location of the Study

The study was carried out in the rabbit unit of the University of Benin Farm Project, University of Benin, Benin City, Nigeria. The university is located on latitude 6° and 6°3'N and longitude 5°E and 6°E with average annual rainfall of about 2162mm, relative humidity of 72.5% and mean annual temperature of about 28°C. The distribution of rainfall divided this zone into two seasons; rainy season (April – September) and dry season (October – March). The study was carried out between September 2018 and May 2019.

Experimental Animals

The offspring of twenty-four New Zealand does were used for the study. The animals had an initial weight range of 450-500g and randomly assigned to two treatment groups (wooden and steel hutches) of twenty (25) rabbits each. The rabbits were balanced for weight. The hutches were housed in a half wall building with concrete floor. The kits were properly identified. Daily management practices peculiar to rabbit production were carried out. The litters were weaned at 28 days of age. The rabbits were fed with commercial chicken grower's feed of 16.38% CP and 2,906 kcal/kg ME. Forages, such as *Panicum maximum*, *Pennisetum purpureum* and *Venonia amagdalina* were given during the day to serve as fibre source.

Data Collection and Analyses

Data were collected on feed intake and body weight weekly using a weighing scale with 0.1kg capacity. The collected data were subjected to T test and R statistical package. Analysis of Economy of Feed Conversion was done. The following indices were used: Weight gain = Final Body weight – Initial Body Weight, Cost of feeding = total feed intake x feed cost, Estimated revenue = price of 1 kg rabbit x weight of rabbit and Feed conversion ratio = feed intake / weight gain. To determine which function would best fit the growth pattern of rabbits, a sequential polynomial fitting was done. The choice of the recommended function was based on R² values. The model functions used are depicted as follows

- Linear $Y = a + bx$
- Quadratic $Y = a + bx + bx^2$
- Exponential $Y = e^{bx}$
- Logistic $Y = K/1 + Ae^{-kt}$

Where: Y= body weight, a = intercept of regression line on Y, b₁, b₂ and b₃ = regression coefficients, X = independent variable (Age of offspring) and e = random error.

RESULTS AND DISCUSSION

The distribution of the weight of rabbits in the wooden and steel hutches according to average percentile are presented in Table 1. Rabbits in the wooden hutches had heavier weight at 25, 50 and 75 percentile. The growth curve of the rabbits in steel and wooden hutches presented in Figure 1 showed that the rabbits in the wooden hutch were slightly heavier.

The economy of feed conversion value of the rabbits as presented in Table 2 showed that the difference in the final weight of the rabbits is 75 g. Though this value may be small but in large population it is substantial. The Table also revealed that the rabbits in wooden hutches significantly gained more weight (p<0.05) and consumed less feed than those in the steel hutches. The finding is consistent with Owen *et al.* (2008) and Jekkel *et al.* (2010) whose studies showed that there is no observed effect on feed intake when rabbits are housed in different systems. The final body weight of 1.575 and 1.501kg in wooden and steel hutches are in line with the study of Orheruata *et al.* (2012) who reported weights at week 20 to be between 1.200 and 1.655 kg. The large standard error in the final body weight of rabbits in steel hutches suggests large fluctuation in the weight of rabbits. The difference in the body weight of the rabbits in the hutches is not surprising considering the climatic situation of the study area. Rastimeshin (1980) stated that wooden hutch would significantly reduce heat stress compared to the steel hutch due to the thermal conductivity of the wood. Similarly, Cheeke (1986) observed that wooden hutches in some areas were superior to hutches with iron frame. Feed conversion ratio (FCR) is a practical and very important variable used in the estimation of the economics of production. This is because it is the only variable that measure the overall technical level of the farm. The FCR value of 5.66 and 6.17 obtained for wooden and steel hutches in this study is high when compared to FCR of 3.2 reported by Rosell and Gonzallez (2007). The differences in the results could be attributed to environmental, management and breed factors. The

analysis of economy of feed conversion of the hutch type shows the strength of wooden hutch as there was better revenue and benefit from rabbits raised in wooden hutch.

The parameter estimates obtained for body weight of rabbits from the polynomial functions are presented in Table 3. The coefficient of determination range from 88.95 to 95.8% and 43.00 to 47.9% in the wooden and steel hutches. The body weight of rabbits in wooden hutches were better predicted using the quadratic function that best explain the variance in their body weight (95.8%) as against (47.9%) in the steel hutch..

Table 1. Distribution of body weight according to average percentile

Average Percentile	Wooden hutch	Steel hutch
25	744.65	703.08
50	1109.50	1055.00
75	1425.10	1423.00

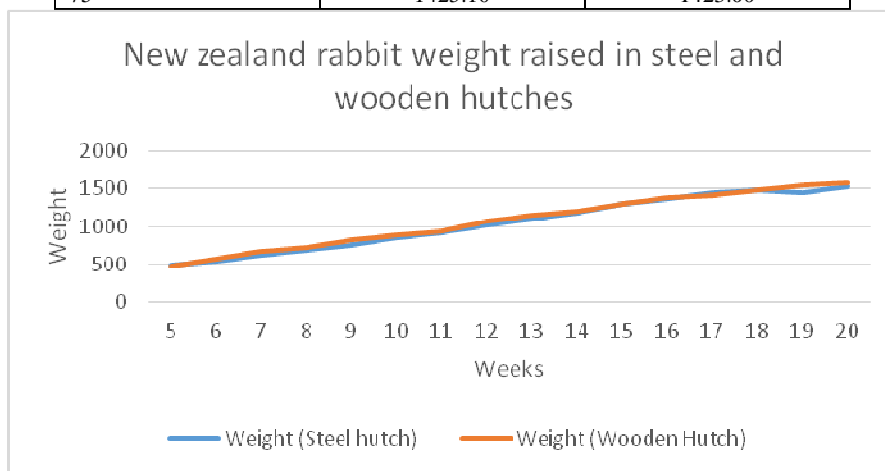


Figure 1: Weights gains of rabbit raised in wooden and steel hutches

Table 2. Economy of Feed Conversion of New Zealand Rabbits in Wooden and Steel Hutches

Parameter	Wooden hutch	Steel hutch
Initial weight (g)	472±48.49	473±49.70
Final weight (g)	1575±86.60	1501±254.9
Weight gain (g)	1103 ^a	1028 ^b
Total feed intake (g)	6249.3 ^a	6420.1 ^b
Feed Conversion Ratio	5.66	6.24
Cost of feeding (₦)	712.38	731.82
Cost of rabbit (₦)	1654.50	1558.50
Benefit (₦)	942.12	826.62

Note: 1kg of rabbit = 1500, 1kg of feed = 114 \$1 = ₦360 as at May 2019

Table 3: Parameter Estimate in Predicting Body Weight from Feed Intake using some Polynomial Functions

Function	Wooden Constant	b1	b2	R ²	Steel Constant	b1	b2	R ²
Linear	-838.37	24.48 ± 2.3*		88.8	-533.71	22.53±6.42*		43.00
Quadratic	1322.72	-38.56±13.67	144±0.09*	95.8	-4040.96	127.54±91.07	-.76.66	44.30
Exponential	129.96	0.03±0.02*		94.20	170.10	0.25±0.01*		47.90
Logistic	0.008	0.97±0.02*		94.20	0.006	0.97±0.01*		47.90

CONCLUSION

The findings of this study conclude that wooden hutches are better for backyard rabbit production in the southern part of Nigeria while the high standard error observed among the mean weight of rabbits in steel hutches could be exploited in selecting for higher body weight of rabbit

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