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Reproductive Performance of New Zealand White, Dutch and Their Crosses Raised in Rivers State, Niger Delta of Nigeria

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Abstract

A total of twenty- four breeding rabbits of New Zealand White (NZW), Dutch (DUT) and their crosses (NZW x DUT) i.e. Eight (8) female rabbits (doe) for each genotype were used to determine the effects of breeds on the reproductive performance of rabbits in Rivers State, Niger Delta, Nigeria, as well as to investigate the correlation between the genotypes and the reproductive performance. The following reproductive performance were considered: Body weight before mating (BWBM), Body weight after mating (BWAM), Body weight before kindling (BWBK), Body weight after kindling (BWAK), Litter size (LS), Litter weight (LW) and Average litter weight (ALW). Body weight was measured using weighing balance. Data generated were analyzed using Statistical Package for the Social Sciences (SPSS). The result showed significant different ($p< 0.05$) in BWBM and BWAM between DUT and NZW x DUT breeds of rabbits, DUT recorded the highest value of BWBM and BWAM while NZW x DUT had the least performance. However, there was no significant different ($p>0.05$) in reproductive performance between NZW and DUT. Furthermore, NZW recorded the highest value in BWBK, BWAK and ALW. There was no significant different ($p> 0.05$) among the genotypes for BWBK, L S, L W and ALW. BWAK showed a significant difference between DUT and NZW x DUT. More so, NZW x DUT recorded the highest values for L S and LW. The results also showed that genotypes effect had negative correlation with BWBW, BWAM, BWAK, BWBK and ALW with correlation values of -0.64, -0.64, -0.207, 0.385 and 0.045 respectively. The genotypes of rabbits also revealed a high correlation between BWBM and BWAM. BWAK showed a high correlation between BWAM and BWBK.

Keywords: Dutch; New Zealand white and Reproductive performance.

1. Introduction

In many countries of the world, rabbit breeding plays an indispensable role in meat and fur production. In recent years, there has been a rising awareness in Rivers State, Niger Delta of Nigeria on the virtues of rabbit production as an alternative means of alleviating food shortages and the problem of inadequate animal protein supply. Apart from its high prolificacy, the rabbit has several advantages over many other farm species, including its high meat quality due to higher protein and much lower fat/cholesterol contents [1]. The most popular breeds used in commercial rabbit production are medium-sized ones such as New Zealand White, Dutch and California [2]. As production directly depends on reproduction, reproductive performance of rabbits becomes an important aspect in determining profitability of commercial rabbit breeding. Factors such as breed, season, age, and weight of females influence the reproductive performance of animals [3]. The production efficiency of commercial rabbit farms is largely dependent on the litter size at kindling and the survivability of the bunnies up to weaning [4]. El-Maghawry, *et al.* [5], also noted higher values for litter size at weaning in spring, while. Litter size at birth and weaning [6] and sex ratio [7] has also been reported of having significant different on breeds of rabbit. Crossbreeding according to Nofal, *et al.* [8] is one of the fast tools offered to the breeders to improve many traits in farm animals. In a study involving New Zealand White and California, Maj, *et al.* [9] observed that crossbred rabbits were heavier than purebred animals. Oke, *et al.* [1], also observed significant differences in growth traits among breeds of rabbits. Das and Yadav [10], reported no significant difference between NZW and SC for prolificacy and litter weights at birth and weaning. The objective of this study was to determine the effect of genotypes on the reproductive performances of rabbits in Rivers State, Niger Delta, Nigeria as well as to investigate the correlation between the genotypes and the reproductive performance.

2. Materials and Methods

The experiment was conducted at Rabbitry unit, Teaching and Research Farm, University of Port Harcourt Rivers State. The animals were housed in hutches made of metals with dimension of 60cmx 60cm x 60cm. The hutches are large enough to allow for easy movement. The experimental animals were fed ad libitum. The research involved twenty four rabbits (does) of three different genotypes i. e. Eight New Zealand White (NZW), Eight Dutch (DUT) and Eight New Zealand White X Dutch (NZW X DUT). The following reproductive parameters were measured ; Body weight before mating (BBBM) , Body weight after mating (BBAM), Body weight before kindling (BBBK) , Body weight after kindling (BBAK) , Litter size (LS), Litter weight (LW) and Average litter weight

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(ALW). The body weight was measured using a balance. Data collected from this research were subjected to statistical analysis using SPSS. Correlation matrix among the various parameters were also considered.

3. Results

Table 1 shows the mean and standard error for the reproductive abilities among the three genotypes of rabbits used for the investigation, the genotypes include; NZW, DUT and NZW x DUT. The result shows significant different ($p< 0.05$) in BWBM and BWAM between DUT and NZW x DUT breeds of rabbits, DUT genotype recorded the highest value of BWBM (2218.33 ± 86.49) and BWAM (2415.83 ± 90.06) while, NZW x DUT (1912.00 ± 57.32) had the least performance in BWBM and NZW recorded the least in BWAM (2154.29 ± 113.95), but there was no significant different between NZW and DUT. NZW recorded the highest values in BWBK (2597.14 ± 95.86), BWAK (2382.86 ± 94.06) and ALW (0.529 ± 0.21) while, there is no significant different ($p< 0.05$) among the genotypes for BWBK, L S, L W and ALW. It also observed that BWAK shows significant different between DUT and NZW x DUT. Crossbred NZW x DUT recorded the highest values for L S and LW.

Table-1. Effect of Genotypes on Reproductive Performances of NZW, DUT and NZW X DUT

GENOTYPES	BWBM	BWAM	BWBK	BWAK	LS	LW	ALW
NZW	2006.14 ± 71.02^{ab}	2154.29 ± 113.95^{ab}	2597.14 ± 95.86	2382.86 ± 94.06^{a}	5.57 ± 0.30	291.43 ± 10.56	0.529 ± 0.21
DUT	2218.33 ± 86.49^{a}	2415.83 ± 90.06^{a}	2496.67 ± 103.33	2356.67 ± 82.75^{a}	5.50 ± 0.52	259.58 ± 20.88	0.482 ± 0.26
NZW x DUT	1912.00 ± 57.32^{b}	2261.25 ± 69.43^{b}	2424.00 ± 109.44	2070.00 ± 55.32^{b}	5.80 ± 0.20	304.00 ± 7.48	0.527 ± 0.22

^{ab} Mean with different superscripts in the same column are differ significantly ($p < 0.05$).
NZW=New Zealand white DUT= Dutch,
BWBM=Body weight before mating, BWAM= Body weight after mating, BWBK=Body weight before kindling, BWAK=Body weight after kindling, LS=litter size, LW=litter weight, ALW=Average litter weight,

Table 2 shows the correlation between all the parameters considered in this study. The result shows that breeds effect has negative correlation with WBW, WAM, WAK, WBK and ALW i.e. -0.64, -0.64, -0.207, 0.385 and 0.045 respectively. Breeds of rabbits also recorded a high correlation between BWBM and BWAM. WAK showed a high correlation between WAM and WBK. WBM recorded positive correlation with different breeds of rabbits. It is also observed that WAM had positive correlation the WBM. WAM also recorded positive correlation with WBM. WBK also had a positive correlation with WAM while, LS, LW, and ALW recorded a very correlation with AK, LS and ALW respectively.

Table-2. Pearson's correlation coefficient of reproductive abilities among three breeds of rabbits

	TRT	BWBM	BWAM	BWBK	BWAK	LS	LW	ALW
TRT	1							
BWBW	- 0.064	1						
BWAM	- 0.064	0.569**	1					
BWBK	- 0.204	0.78	0.493*	1				
BWAK	- 0.385	0.193	0.711**	0.811**	1			
LS	0.054	- 0.400	0.020	0.212	0.215	1		
LW	0.039	- 0.440*	- 0.120	0.219	0.066	0.765**	1	
ALW	-0.450	0.015	-0.129	0.480	- 0.173	- 0.384	- 0.280	1

BWBM=Body weight before mating, BWAM= Body weight after mating, BWBK=Body weight before kindling, BWAK=Body weight after kindling, LS=litter size, LW=litter weight, ALW=Average litter weight

4. Discussion

The result from Table 1 indicated that there was a significant different ($p<0.05$) of genotypes on the BWBM, BWAM and BWAK. The result obtained is in agreement with the findings of Ozimba and Lukefahr [11] where genotypes has significant effect on growth performance of breeding stocks. Genotypes effect showed no significant ($P<0.05$) on the BWBK, LS, LW and ALW. DUT dams recorded the highest values for BWBM and BWAM. However, dams from NZW x DUT recorded the lowest values in BWBM, BWAM, BWBK, BWAK and ALW. It is also observed that NZW had highest values of BWBK, BWAK and ALW. This in concordance with the report of Ghosh, *et al.* [12] where there were significant ($P< 0.05$) genotype effects on litter weights at birth and litter size at weaning with New Zealand White breeds being superior to their California White counterparts. The New Zealand White genotypes has been identified as a suitable dam breed due to its favourable maternal qualities [11] hence its superior reproductive performance. NZW XDUT recorded the highest values for LS and LW. This agrees with the results of Ghosh, *et al.* [12] where it was observed that crossbred rabbit performed better than purebred rabbits but, however, disagrees with the findings of Kumar, *et al.* [13], Oke and Iheanocho [14] and Kumar, *et al.* [13]who found no significant differences among similar breeds maintained under similar environments.

Table 2 showed the correlation between some reproductive abilities among the three breeds of rabbits. The results showed that there were various significant ($p<0.05$) positive correlation between BWAM and BWBM also between BWBK and BWBM/BWAM, likewise between BWAK and BWBM, BWAM and between BWBK. This

implies that genetic improvement in one the mentioned reproductive traits leads to improvement in the other traits. In contrary, negative correlation were recorded between the breeds and BWBM, BWAM, BWBK, BWAK and ALW.

5. Conclusion

The most popular breeds used in commercial rabbit production are medium-sized ones such as New Zealand White and Dutch, these are mostly found among the rabbit farmers in Rivers State, Niger Delta, Nigeria. Production directly depends on reproduction, reproductive performance of rabbits becomes an important aspect in determining profitability of commercial rabbit breeding. Factors such as genotypes, season, age, and weight of females influence the reproductive performance of animals. The production efficiency of commercial rabbit farms is largely dependent on the litter size at kindling and the survivability of the bunnies up to weaning.

The documented genotypes differences in growth rate for exotic breeds could be exploited and used in breeding programme to develop a fast growing indigenous strain adaptable to hot environment.

It is expected that the result of this study will prove a useful guide to the rabbit farmers to stay in business as well as attract perspective farmers into the business and this will ultimately bridge the protein deficiency gaps in Rivers State.

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