EFFECTS OF BREED AND PARITY ON REPRODUCTIVE PERFORMANCE OF RABBITS REARED IN SOUTH WESTERN ZONE OF NIGERIA

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ABSTRACT
This study determined the effect of breed and parity on the reproductive performance of rabbits. A total of 60 rabbits (48 does and 12 bucks) of about 16-18weeks of age belonging to three different breeds namely New Zealand White, Hyla and Dutch were used for the study and the parameters considered includes gestation length (GL), litter size at birth (LSB), individual kit weight at birth(IKWB), litter birth weight (LBW), pre-weaning mortality (PWM), litter size at weaning (LSW), individual kit weight at weaning (IKWW) and litter weight at weaning (LWW) and only three parities (first, second and third) were considered. Data generated were analysed using SAS (2008) to evaluate the effect of breed as well as parity on reproductive performance of doe. The analysis of the data showed that Significant ($P<0.05$) differences existed among individual kit weight at birth, litter birth weight, individual kit weight at weaning and litter weight at weaning. However no significant ($p>0.05$) differences existed among gestation length, litter size at birth, preweaning mortality, litter size at weaning, and milk production of the does. It is known that, when rabbit does begin their reproductive life, they usually have not achieved their total body development yet and, for this reason, the litter parameters (IKWB and LW) are lower compared to the subsequent parturitions. Breed had no significant effect ($p>0.05$) on most of reproductive traits measured. The statistical similarity ($p>0.05$) among the three breeds of rabbits may be attributed to indiscriminate breeding of rabbits and lack of pure breed. However, breed may be considered for individual kit weight at birth. Rabbit farmers in the South Western Zone of Nigeria could take advantage of maturity in the third parity does in terms of improved LBW and IKWB as revealed by the present study except when interest is on IKWW and LWW for which the first parity is recommended.
Keywords: Rabbits, reproductive parameters, breed, parity, south western zone

INTRODUCTION

According to the world health organization (WHO, 2017) malnutrition has been highlighted as a major problem confronting the worldwide population, particularly in developing nations. This is signaled by the acute shortage in meeting the vast dietary protein demands and the ensuing fierce competition between man and livestock (Suman *et al.,* 2015).

Oloruntola *et al*. (2015) reported that rabbits possess some features which includes small body size, rapid growth, high reproduction potential, short generation interval, production of top quality meat, good potential for genetic improvement, ability to utilize non-competitive feeds among others. This several features supports its production at both commercial and subsistence levels and presents it as one of the solutions that solves the problems of low protein intake in the developing nations (Oloruntola *et al*., 2015).

The effective overall performance of commercial rabbits is largely dependent on the litter size at kindling and the survivability of the kits up to weaning (Odeyinka *et al*., 2008). Thus litter traits such as litter size at birth and weaning and litter weight at birth and weaning are of economic importance for the profitable expansion of the rabbit industry (Odeyinka *et al*., 2008).

Apori *et al*. (2014) asserted that the reproductive performance of rabbits is greatly influenced by genetic and environmental factors. Thus Improvement of rabbit genetically, is a vital scope on the way to increasing their contribution to the much needed animal protein in developing countries (Okoro *et al*., 2010). A prerequisite for this improvement is the knowledge of their breeds and parity, litter growth and weaning characteristics in many generations (Fayeye and Ayorinde, 2010).

In Nigeria, many breeds of rabbits are available in most farms, these breeds include the New Zealand White, Californian, Angora, Rex amongst others (Aduku and Olukosi, 1990). The productive performance of Californian White and New Zealand White in particular has been studied by Lukefahr and Hamilton (1997). Moreover, detailed information about the effect of breed, and parity on the reproductive performance of rabbit in the South Western zone of Nigeria is not available for commercial rabbit farming, therefore this study was design to study the effect of breed and parity on three (3) rabbit breeds.

MATERIALS AND METHODS

Experimental site

The study was carried on the Rabbit Unit, of Livestock Teaching and Research Farm of the Federal University of Technology, Akure, Ondo State, Nigeria. Akure is situated on 350.52m above the sea level at latitude 7^0 15'N and 5^0 12'E (Climatedata, 2018). The temperature is 26.2^0C and the relative humidity is 78%. The vegetation of the region is that of the rainforest characterized by hot and humid climate. (Climatedata, 2018).

Experimental Animals and Managements

A total of 60 rabbits belonging to three different breeds used in this study were soured from a reputable rabbitary in Ondo State and its environs. The different breeds used in the study were New Zealand White, Hyla and Dutch, each having 48 adult females (does) and 12 adult males (bucks). The 54 does were in the age group of 5-6 months and weighed 2.0 to 2.20 kg, while the 6 bucks belong to the age category of 6-7 months and weighed 2.4 to 2.6 kg.

All animals were identified by ear tagging and kept individually in rabbit cages (two feet above floor level) with each cell measuring 40x50x30cm. The animals were managed based on standard experimental procedure on arrival at the rabbittry. The animals were given prophylactic treatment against bacterial and viral infection using a broad spectrum antibiotic, oxytetracycline hydrochlorine e.g 50mg (soluble powder-5%w/w) at recommended dosage of one teaspoonful in four litres of chlorine free water. The does were first mated using natural mating at 6-7 months of age. The does were fed according to their physiological status during the study period. They were fed concentrate and forages throughout the study period. Concentrate was fed in the mornings at 140g feed/doe/day and 320g feed/doe/day to pregnant and lactating does respectively. The proximate composition of the commercial diet was 15%CP, 7.2%CF, 0.67%EE, 8% ash, 2300Kcal kg ME and 91.76% dry matter. The rabbit were fed forages (*Panicum maximum* and *Centrosema pubescens*) in the evening.

Data collection

Data were collected according to parity order from the different breeds. The reproductive parameters that were recorded include: Gestation length (GL), Litter size at birth (LSB), Individual kit birth weight (IKBW), Litter birth weight (LBW), Pre-weaning mortality (PWM), Litter size at weaning (LSW), Individual kit weight at weaning (IKWW) and Litter weight at weaning (LWW). The weights was determined using a Salter (model 235) spring balance. The variables was obtained by the procedure described by Food and Agricultural Organization FAO. (2012).

Analytical procedure

All data collected were subjected to analysis of variance using statistical software package SAS (2018) and Duncan Multiple Range Test was used to separate the mean differences among treatments while a regression equation was developed for modelling. The experimental design adopted in this study is Completely Randomized Design. The model used was $Y_{ijk} = \mu + B_i + D_j + (BD)_{ij} + e_{ijk}$

where: Y_{ijk} = individual observation associated with the effects of breed and parity

μ = overall mean

B_i = fixed effect of i^{-th} breed (i = 1, 2, 3)

D_j = random effect of j^{-th} parity (j = 1,2,3)

BD_{ij} = interaction between breed and parity

e_{ijk} = residual error

RESULTS AND DISCUSSION

Table 1: Least square means (±SEM) and standard errors of reproductive performance traits as affected by parity of rabbits

Traits	Parity		
	First	Second	Third
Gestation length (GL)	30.87±0.17	30.98±0.13	31.08± 0.12
Litter size at birth (LSB)	3.64± 0.23	3.33±0.17	3.54± 0.26
Individual kit weight at birth (IKWB) (g)	40.00±0.00^b	40.00±0.00^b	50.00±0.00^a
Litter birth weight (LBW) (g)	160.00± 0.01^{ab}	140.00±0.01^b	190.00±0.02^a

Preweaning mortality (PWM) (%)	13.86±2.55	11.49± 2.47	16.24±3.58
Litter size at weaning (LSW)	3.02±0.18	2.83± 0.13	2.85±0.20
Individual kit weight at weaning (IKWW) (g)	370.00± 0.01^{a}	380.00± 0.01^{a}	320.00±0.01^{b}
Litter weight at weaning (LWW) (g)	1120.00±0.06^{a}	1080.00±0.06^{ab}	910.00±0.07^{b}
Milk production of does (MP)	0.54±0.04	0.54±0.04	0.45±0.04

^{abc}Means along the same row with different superscripts were significantly (P>0.05)

Table 1 revealed the least square means and standard errors of reproductive performance traits as affected by parity of rabbits. Significant (P<0.05) differences existed among individual kit weight at birth, litter birth weight, individual kit weight at weaning and litter weight at weaning. However no significant (p>0.05) differences existed among gestation length, litter size at birth, preweaning mortality, litter size at weaning, and milk production of the does. The third parity recorded a higher litter birth weight (190.00g) than the first (160.00g) and second parity (140.00g) likewise the third parity had a greater individual kit weight at birth (50.00g) than second parity (40.00g) and third parity (140.00g). This observation agrees with the earlier reports of Ayo-Ajasa et al. (2015). It is known that, when rabbit does begin their reproductive life, they usually have not achieved their total body development yet (Castellini *et al*. 2010) and, for this reason, the litter parameters (IKWB and LW) are lower compared to the subsequent parturitions. This was confirmed also in the present study, where IKWB and LW peaked in the 3rd parturition when does have already achieved adult body size.

Table 2: Least square means (±SEM) and standard errors of reproductive performance traits as affected by different breed of rabbits

Traits	Breed		
	Dutch	Hyla	New Zealand white
Gestation length (GL)	30.95±0.15	30.92±0.13	31.00±0.17
Litter size at birth (LSB)	3.48±0.20	3.50±0.24	3.51±0.21
Individual kit weight at birth (IKWB) (g)	40.00±0.00^{b}	40.00±0.00^{b}	50.00±0.00^{a}
Litter birth weight (LBW) (g)	150.00± 0.01	150.00±0.01	170.00±0.01
Preweaning mortality (PWM) (%)	15.95±2.92	13.86±2.63	10.46±2.64
Litter size at weaning (LSW)	2.81±0.15	2.92±0.20	3.00±0.14
Individual kit weight at weaning (IKWW) (g)	360.00±0.01	370.00±0.01	360.00±0.01
Litter weight at weaning (LWW) (g)	1000.00±0.07	1060.00±0.06	1110.00±0.06
Milk production of does (MP)	0.49±0.04	0.52±0.04	0.55±0.04

^{abc}Means along the same row with different superscripts were significantly (P<0.05)

The least square means and standard errors of reproductive performance traits as affected by different breeds of rabbit are as shown in Table 2. There existed no significant (P>0.05) variation among the breeds of rabbit and all the reproductive parameters except for individual kit weight at birth. The statistical similarity among the three strains of rabbits may be attributed to indiscriminate breeding of rabbits in the south western environment and the resultant lack of pure breeds. However there is a significant (P<0.05) difference among the breeds of rabbit on Individual kit weight at birth. The New Zealand White showed superiority in terms of individual kit weight at birth (50.00g) than Hyla (40.00g) and Dutch (40.00g). The findings gotten from this study also corroborate with that of Das and Bujarbarwa (2005) which found no effect of breed on LWB. Iraqi, Ibrahim, Hassan and Deghadi, (2006) report also corroborated with this finding in terms of LSB and LSW.

CONCLUSION

Breed had non-significant effect (p>0.05) on most of the parameters measured. However, breed may be considered for individual kit weight at birth. Rabbit farmers in the South Western Zone of Nigeria could take advantage of maturity in the third parity does in terms of improved LBW and IKWB as revealed by the present study except when interest is on IKWW and LWW for which the first parity is recommended.

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