EFFECTS OF GENOTYPE AND SEX OF KITS ON LITTER SIZE AND POST WEANING WEIGHT GAINS OF CROSSBRED RABBITS

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ABSTRACT

Heterosis continues to form the basis for adoption of crossbreeding programs in the improvement of commercial rabbit industry in Nigeria. To further improve on it, this study evaluated the effect of sex of kits and parents' genotypes on litter size and post weaning weight gains of pure and local crossbred rabbits. A total of thirty six (36) parent stock rabbits consisting of six (6) pure breed bucks (2 each of Chinchilla, Dutch and New Zealand White) and thirty mixed local population of does were used as base population. A mating ratio of 1:5 buck to does was used. After kindling, data were collected on litter size, litter weight at birth and body weight gains of different sexes across 4, 8, 12, 16 and 20 weeks. Data derived were subjected to analysis of variance for statistical analysis as described for Completely Randomized Design. Significant means were separated using Duncan Multiple Range Test (DMRT). Results obtained reveals that while buck genotype had no significant effect ($P>0.05$) on the litter size at birth, the litter weight at birth was significantly different ($p<0.05$). Also, the result indicates that at the initial stages of our study (4-8 weeks), the progressive weekly body weight gain were the same across the crossbreds but was significantly different ($p<0.05$) at the latter stages (8-20 weeks) with NZxLC cross performing better. In conclusion, following our present findings, we can recommend that local breeds of rabbit should be crossed with New Zealand white rabbit bucks for improved post weaning weight gains.

Keywords: crossbreeding, rabbits, genotype, litter size, weight gain

INTRODUCTION

According to Morenikeji *et al.*, (2019), breeding programs depend on the selection of good genotype and the sex through which the effort will be concentrated upon for the propagation of the next generation. While quantitative qualities are influenced by the genotype and environment, production traits in farm animals are the result of the additive effect of the genes. Therefore choice of genotype for a particular trait in commercial animal production is the one of the most decisive steps for both breeders and producers.

The rabbit is regarded as a veritable source of animal protein due to the prolificacy, excellent meat quality, no known taboo (cultural or religious), fast growth, short gestation period, small body size and ability to utilize feeds that are not competed for by man, Egena *et al.*, (2014).

Various genetic studies have demonstrated that genotype has an influence on weaning weight in rabbits (Pasupathi *et al.*, 2014; Youssef *et al.*, 2008; Attalah 2005). Chineke, (2005) reported that the choice of breeds for commercial production should be based on weaning and post weaning kit performance and in addition, the genotype and sex which are important sources of variation should be considered in improvement programmes to increase meat yield from rabbit breeds.

The high level of genetic diversity and population structures in both exotic and indigenous rabbit breeds can be exploited in crossbreeding schemes resulting in increased performance in rabbit meat production. This might mean crosses of exotic and low performing indigenous rabbit breeds in the tropics would register improved weaning weight due to heterotic effect or genetic distance according to Asan (2018). Therefore, this study evaluated the effect of sex of kit and parent genotype on litter size and post weaning weight gains of rabbit crossbreds between selected pure line breeds and locals.

MATERIALS AND METHODS

This study was carried out using thirty six (36) parent stock rabbits with an average weight of 4.5kg. Two male breeds of Chinchilla (CH), Dutch (DU) and New Zealand White (NZ) made up the pure breeds while thirty (30) local mixed populations does were used. The rabbits were sourced from National Veterinary Research Institute (NVRI) Vom, Jos, Plateau State, Nigeria and housed in well cleaned and disinfected hutches with dimensions 70x60x50cm each. The bucks and does were housed separately. The animals were allowed two (2) weeks adjustment period on the experimental site before commencement of the research. Does were randomly assigned to bucks a a ratio of 1:5. Matings were carried out once per day with one doe after the other on a three (3) day interval between 6-7am each day. The does were each taken to the designated bucks to enhance successful mating. Each doe was palpated 10days post-mating to detect pregnancy. Those that failed to conceive were returned to their assigned bucks to be mated again. Nesting boxes were provided on the 21st day after successful mating. Commercially pelleted available rabbit ration containing 16.23% crude protein, 10.27% crude fiber and 2280 Kcal/kg energy was fed to the rabbits in the morning, and fresh forages (*centrocema pubenscens* and cedar *acuta*) were served in the evening. Both ration and water were provided *ad libitum*. Pregnant does were allowed to kindle without any interference and kits produced were nursed by their respective dams. The kits were sexed prior to weaning and housed separately. The data collected were litter size at birth, litter weight at birth and progressive post weaning weekly weights of the different sexes. Data derived were subjected to analysis of variance for statistical analysis as described for Completely Randomized Design. Significant means were separated using Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The results of the effect of buck genotype on litter size and birth weight are presented in table 1. It reveals that while buck genotype had no significant effect (P>0.05) on the litter size at birth, the litter weight at birth was significantly different (p<0.05) across the different genotypes. The results of the effects of buck genotype on the post weaning weight gain to 20 (twenty) weeks of age are presented in table 2. There was no significant difference (P>0.05) in the post weaning weight gain of the crosses. However, DUxLC crosses showed numerically higher weight gains (261.55±14.10 and 899.03±32.13) at 4th and 8th week respectively. At weeks 12, 16 and 20, the crosses showed significantly different (P<0.05) post weaning weight gains with NZxLC cross performing better than other crosses. Kits from larger litters generally experience lower weight at weaning as compared with their counterparts in smaller litters. Kits from NZxLC cross had the least litter size at birth and least litter weight at birth but progressively, they performed better than other crossbreds. According to Ayorinde and Oke, (1995), variations in body weight within a flock can be as a result of the influence of genetic variation and environmental factors on the animal. Body weight is regarded as a function of framework or size of the animal and its condition. The results of the effects of sex of kits on birth weight and body weight gain within genetic groups are presented in table 3. Sex of kit had no significant effect (P>0.05) on both the birth weight and body weight gain of the crossbreds except at week 20. Similar non-significant effect was observed in the findings of Marykutty, and Nandakumar, (2000). The only significant effect was seen in DUxLC cross where female kits had significantly higher body weight gain (P<0.05) than their male counterparts. Also, apart from CHxLC cross, the female kits of other crosses had numerically higher body weight gains from week 4 to 20. Ologbose *et al.,* (2017) reported that female kits of Dutch pure breeds of rabbits recorded highest value of body weight gains compared to their male counterparts. Generally, higher body weight gains in females is attributed to increase in adipose tissue deposition, increase in uterine wall capacity associated with maturity, as female rabbits mature earlier than males.

Table1: Effect of buck genotype on litter size and birth weight (g) of cross bred rabbits

Genotype / Parameters	DUxLC	NZxLC	CHxLC	LOS
LSB	3.90±0.43	3.25±1.03	4.36±0.39	NS
LWB (g)	43.82±1.43^{a}	38.08±2.60^{b}	38.52±0.93^{b}	*

DU-Dutch; NZ-New Zealand white; CH-Chinchilla; LC-Locals; LSB-Litter size at birth; Litter weight at birth; LOS-Level of significance; *- significant at 0.05; NS-Not significant

Table 2: Effect of buck genotype on post weaning weight gain (g)

Genotype/ Weeks	DUxLC	NZxLC	CHxLC	LOS
Week 4	261.55±14.10	246.23±32.20	255.89±8.48	NS
Week 8	597.92±25.39	533.15±61.80	501.58±15.25	NS
Week 12	899.03±32.1 [a]	851.80±98.91[ab]	800.79±26.53 [b]	*
Week 16	1200.13±34.65[a]	1231.11±102.14[a]	1018.59±32.02[b]	*
Week 20	1604.48±30.20[a]	1605.89±73.20[a]	1270.14±30.17[b]	*

DU-Dutch; NZ-New Zealand white; CH-Chinchilla; LC-Locals; LSB-Litter size at birth; Litter weight at birth; LOS-Level of significance; *- significant at 0.05; NS-Not significant

Table 3: Effect of sex of kit on birth weight and body weight gain (g) within genetic groups of crossbred rabbits (Males and females)

Genotype	DUxLC		NZxLC		CHxLC		
Sex	M	F	M	F	M	F	LOS
BW	41.00±1.95	45.78±1.94	38.40±1.75	37.88±4.21	37.96±1.30	39.13±1.35	NS
Week 4	228.80±16.72	282.91±19.59	205.40±7.51	271.75±50.93	226.52±13.27	225.26±10.86	NS
Week 8	539.21±24.38	633.65±36.47	469.40±13.71	573.00±99.91	485.86±17.553	518.95±25.54	NS
Week 12	841.62±37.08	936.35±46.03	712.25±19.80	944.50±157.78	764.22±26.11	844.67±47.87	NS
Week 16	1130.02±45.50	1250.11±47.35	1031.00±11.52	1391.20±151.86	1002.38±43.42	1038.54±48.75	NS
Week 20	1512.80±47.4[b]	1670.67±31.8[a]	1455.75±8.36	1726.00±105.52	1273.38±39.15	1266.15±48.75	*

DU-Dutch; NZ-New Zealand white; CH-Chinchilla; LC-Locals; LSB-Litter size at birth; Litter weight at birth; LOS-Level of significance; *- significant at 0.05; NS-Not significant