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Breeding and Productive Performance of Three Breeds of Rabbit in South-West Nigeria

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Abstract - Three breeds of rabbit-Giant Flemish (GF), Chinchilla (CH) and Rex (RX) were procured from a reputable farm in South-West Nigeria for crossbreeding to determine the productive performance of each breed and with the aim of selecting the most superior genotype(s) for increased rabbit production. Animals were paired and the pairing resulted into six genetic groups. A total of twenty-one animals (18 does and 3 bucks) were involved. Data on productive traits such as litter size at birth and at weaning, litter weight at birth and at weaning, gestation length in each female breed, percentage mortality during pre-weaning in each group and percentage survivability till weaning were collected for each crossing. Results shows that mean litter size at birth in the genetic groups ranged from 1.67±0.33 to 4.00±0.00 and mean litter size at weaning was between 1.67±0.33 and 3.00±0.58 in groups CH vs. RX and RX vs. GF, respectively. Mean litter weight at birth was between 39.18±0.74 and 43.56±0.88 g. In the genetic groups with the exception of CH vs. RX, mean litter size at birth (MLS@B) was greater than mean litter size at weaning (MLS@W). Gestation length of the breeds of rabbit used ranged from 29.67±0.66 to 30.33±0.67 days. Genetic group CH vs. GF has the highest mean litter weight at birth and highest mean litter weaning weight.

Keywords : *Breeding, hierarchic design, Nigeria, performance, rabbit.*

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Breeding and Productive Performance of Three Breeds of Rabbit in South-West Nigeria

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Abstract - Three breeds of rabbit-Giant Flemish (GF), Chinchilla (CH) and Rex (RX) were procured from a reputable farm in South-West Nigeria for crossbreeding to determine the productive performance of each breed and with the aim of selecting the most superior genotype(s) for increased rabbit production. Animals were paired and the pairing resulted into six genetic groups. A total of twenty-one animals (18 does and 3 bucks) were involved. Data on productive traits such as litter size at birth and at weaning, litter weight at birth and at weaning, gestation length in each female breed, percentage mortality during pre-weaning in each group and percentage survivability till weaning were collected for each crossing. Results shows that mean litter size at birth in the genetic groups ranged from 1.67±0.33 to 4.00±0.00 and mean litter size at weaning was between 1.67±0.33 and 3.00±0.58 in groups CH vs. RX and RX vs. GF, respectively. Mean litter weight at birth was between 39.18±0.74 and 43.56±0.88 g. In the genetic groups with the exception of CH vs. RX, mean litter size at birth (MLS@B) was greater than mean litter size at weaning (MLS@W). Gestation length of the breeds of rabbit used ranged from 29.67±0.66 to 30.33±0.67 days. Genetic group CH vs. GF has the highest mean litter weight at birth and highest mean litter weaning weight. Based on the results of this study, it was concluded that genetic groups CH vs. GF, GF vs. RX, and GF vs. CH be considered for increased rabbit production in South-West, Nigeria.

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I. Introduction

A mating design often encountered in breeding programme is the hierarchic design in which several females are mated to one male only. In hierarchic design, several progeny can be generated and such progeny are very easy to measure to provide useful data. With the increase in human population especially in developing country like Nigeria, the supply of enough animal protein from the five principal livestock species (cattle, sheep, goats, swine and poultry) had become impossible, hence the interest in microlivestock such as rabbit because its production has enormous potential in alleviating the problem of animal protein supply in developing economy according to Cheeke (1986); Biobaku and Dosunmu (2003); Fayeye and Ayorinde (2003). The important attributes of rabbits as microlivestock include small body size, short generation interval, ability to utilize less competitive feeds, rapid growth, potentials for genetic improvement and production of high quality meat and useful by-products (Cheeke, 1986; Egbo *et al.,* 2001; Herbert, 2011). Apart from high temperature usually above 30^{0}C which may impose undue stress on the animal, rabbit production can significantly contribute to man's need at all times. Genetic improvement of rabbit is important in order to increase their contribution to the much needed animal protein in Nigeria. A prerequisite for this improvement is the knowledge of their breeding pattern and the ability to select for highly prolific individuals. In searched literature, litter growth and weaning characteristics in two generations of straightbred and crossbred rabbits have been reported by Fayeye and Ayorinde (2003, 2010). However, because of inbreeding depression which is often associated with purebreeding activities in livestock production enterprise, it is desirable to encourage crossbreeding among breeds so as to exploit the full potentials of different breeds. Crossbreeding according to Nofal *et al.* (1997) and Oseni *et al.* (1997) is one of the fast tools offered to the livestock breeders to improve many traits in farm animals. Rabbits because of its enormous benefits associated with its production and with the belief that the microlivestock will certainly bridge the animal protein gap been experienced by man, it is imperative to give available rabbit breeds the needed attention just like other animal genetic resources so as to have more animal products that could supply the immediate needs of man.

In South-West Nigeria, three rabbit breeds available in most farms are the Giant Flemish, Chinchilla and the Rex. Other breeds abounds in some well organised farms in this part of the country include the New Zealand White, Californian White, etc. The productive performance of New Zealand White and Californian White in particular has been studied by Lukefahr and Hamilton (1997) and straight breeding as well as crossbreeding of these same breeds of rabbits have been reported by Fayeye and Ayorinde (2003); Odeyinka *et al.* (2008).

However and to our own knowledge, productive performance of Giant Flemish, Chinchilla and Rex breeds of rabbit involved in crossbreeding activities have not been reported. The objective of this study was to attempt several crossings involving these three breeds of rabbit so as to know the superior genotype(s) and their productive performance before intense

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selection and breeding programmes on them can be initiated.

II. Materials and Methods

a) Experimental site, sample size and animal management

A breeding farm in Camp, Odeda Local Government Area of Ogun State, Nigeria was used. Odeda Local Government Area shares boundary with Abeokuta South, Abeokuta North, Obafemi-Owode Local Governments and Oyo State in the South-West, East, and North respectively. The climate in the area is tropical with maxima rainfall from April-July and September-October. The average temperature in the area is about 32°C, but relative humidity can be as high as 95%. The study reported herein was carried out between January and April 2011. A total of twenty one rabbits (eighteen does and three bucks) of three different breeds were procured from a private farm in Ibadan, Oyo State, Nigeria. They were thereafter conveyed to Abeokuta.

The breeds of rabbit used in this study were Giant Flemish, Chinchilla and the Rex, respectively. The ratio of does to buck procured in each breed was 6:1. The dimension of each hutch used was 70 x 60 x 50-cm. Before taken the does to the bucks, the animals were allowed two weeks of adjustment period to the experimental site. Buck of each rabbit breed was kept in individual hutch and rabbit does were taken to the bucks. Six does of the same breed were mated to a buck. After mating, the does were taken to their designated hutches. Commercial diet and quality drinking water were provided *ad libitum* to the rabbits. Diet requirement was in accordance with what was suggested by Ouyed and Brun (2008) for these microlivestock. For increased libido, normal erection and ejaculation by the bucks, a drug called *Viagra* was procured from a pharmacy shop in Abeokuta, Nigeria and 0.75 mg of the drug was dissolved in the drinking water of the bucks at the same time. Pregnancy determination in the does was by abdominal palpation only. Pregnant does were allowed to kindle without any interference and kittens produced were nursed by the does for four weeks before they were weaned.

b) Mating patterns in this study

The three breeds of rabbit used were Giant Flemish (GF), Chinchilla (CH) and Rex (RX). The breeds were paired and the pairing resulted into six different combinations represented in Table 1.

c) Data collection and statistical analysis

Litter size at birth and at weaning as well as litter weight at birth and at weaning, gestation length in each female breed, percentage mortality during pre-weaning in each genetic group and percentage survivability till weaning were considered for each crossing. Descriptive statistics were carried out on the data generated and results were expressed as means and their standard error of means. To ascertain whether there are differences in means, Duncan Multiple Range Test (DMRT) was carried out with all the means. For percentage survivability (%S), the method used was similar to that of Odeyinka *et al.* (2008). In this study, %S was depicted as: %S = (100MLS@W)/MLS@B, and percentage mortality was obtained as: 100% - %S, where MLS@B = Mean litter size at birth and MLS@W = Mean litter size at weaning, respectively.

III. Results and Discussion

The productive performance or traits of the three breeds of rabbit used in several crossings are shown in Table 2. In this study, the mean litter size at birth in all the genetic groups ranged from 1.67±0.33 to 4.00±0.00 and mean litter size at weaning was between 1.67±0.33 and 3.00±0.58 in genetic groups CH vs. RX and RX vs. GF, respectively (Table 2).

The highest mean litter weight at birth was 43.56±0.88 and the least was 39.18±0.74 in genetic groups CH x GF and GF x CH. Similarly, the highest mean litter weight at weaning was also obtained in genetic group CH x GF. The least value for this trait was observed in mating pattern that involved Rex buck with Giant Flemish does. Gestation length of rabbit does involved in the breeding activities were almost same. Percentage survivability was very high in all the genetic groups. In this study, highest percentage mortality of 30.03% was observed in genetic group GF x RX (Table 2).

Apart from CH vs. RX, where mean litter size at birth and at weaning were low, all other values obtained for these economically important traits were consistent with values reported by Sorensen *et al.* (2001) and Odeyinka *et al.* (2008) for some breeds of rabbit. Mean litter weight at birth reported in literature oscillates between 38.95 and 42.31 g (Fayeye and Ayorinde, 2010). In the six mating patterns carried out in this study, the mean litter weight at birth was between 39.18±0.74 and 43.56±0.88 g for groups GF vs. CH and CH vs. GF, respectively. These values were consistent with values reported in literature. Apart from the genetic group CH vs. RX, where MLS@B and MLS@W are equal because of lack of pre-weaning mortality, in other groups, MLS@B was greater than MLS@W. A similar situation (i.e. LSB > LSW) in breeds of rabbit had been reported by Sorensen *et al.* (2001).

Gestation length of the breeds of rabbit used was not significantly ($P>0.05$) different among the genetic groups. The range of values for this trait in all the groups was from 29.67±0.66 to 30.33±0.67 days (Table 2). These values corresponds favourably to the 28.10 to 30.40 days and 29.92 days reported in southern and northern Nigeria by Odeyinka *et al.* (2008);

Akpa and Alphonsus (2008) for some breeds of rabbit. Also, the gestation length of the breeds of rabbit used was within the range of length of gestation reported by Sorensen *et al.* (2001). However, the gestation length for the group of rabbits used in this study was slightly lower that the values reported by Fayeye and Ayorinde (2010). The slight variation in values might be as a result of breed differences, feeding regime and other management strategies involved.

In this study, genetic group CH vs. GF has the highest mean litter weight at birth and highest mean litter weaning weight. This may be due to good mothering ability of the Giant Flemish does to their kittens or may be because they were able to acclimatise to the experimental site better than other breeds of rabbit used. Therefore, this genetic group may be selected for increased rabbit production in South-West Nigeria. Percentage survivability of the progeny of this particular genetic group till weaning was about 78%. In group CH vs. RX, mean litter size at birth and weaning were very low, but all the kittens produced survived and hence percentage survivability was 100%. In the absence of other genetic groups used in this study, rabbit breeders and farmers alike can also invest on this group and subsequently cross them with more prolific breeds for better performance. Apart from genetic group CH vs. RX where percentage mortality was zero, it was 18.26 to 30.03% in all other groups unlike the 16 to 19% previously reported by Sorensen *et al.* (2001) for breeds of rabbit. This therefore means that kittens of breeds of rabbit needs proper handling, balanced diet, sound medication and favourable production environment at all times to lessen this high mortality percentage.

IV. Conclusion

Based on the results of this breeding experiment, it was concluded that genetic groups CH vs. GF, GF vs. RX, and GF vs. CH be considered for increased rabbit production in South-West, Nigeria. Where resources are available, the mating patterns described in this study may be carried out with more animals and for prolong period too.

Table 1 : Six mating patterns involving three breeds of rabbit in South-West, Nigeria

No. of crossing	Sex		Resulting genotype or genetic group*
	Buck	Doe	
I	GFx	RX (3)	GFRX
II	RX x	GF (3)	RXGF
III	GF x	CH (3)	GFCH
IV	CH x	GF (3)	CHGF
V	RX x	CH (3)	RXCH
VI	CH x	RX (3)	CHRX

** GF = Giant Flemish, CH = Chinchilla and RX = Rex breeds of rabbit; Number in parenthesis represents number of does used in this study.*

Table 2 : Summary statistics of the productive performance of three breeds of rabbit in six mating patterns in South-West Nigeria*

Mating pattern or genetic group	Productive performance of three breeds of rabbit in six different mating patterns						
	Mean litter size at birth (MLS@B)	Mean litter size at weaning (MLS@W)	Mean litter weight at birth (MLW@B) (g)	Mean litter weight at weaning (MLW@W) (g)	Mean gestation length (GL) (days)	% Survivability (%S)	% Mortality (%M)
GF x RX	3.33±0.34	2.33±0.33	42.10±0.92	222.86±3.59	30.33±0.67	69.97	30.03
RX x GF	4.00±0.00	3.00±0.58	41.42±0.89	207.78±5.96	30.33±0.67	75.00	25.00
GF x CH	3.67±0.33	3.00±0.58	39.18±0.74	222.22±7.95	30.00±0.58	81.74	18.26
CH x GF	3.00±0.00	2.33±0.33	43.56±0.88	271.43±40.08	29.67±0.66	77.67	22.33
RX x CH	4.00±0.00	3.00±1.00	40.92±1.11	214.44±7.09	29.67±0.66	75.00	25.00
CH x RX	1.67±0.33	1.67±0.33	40.60±1.15	216.00±6.48	30.33±0.67	100.00	0.00

** Abbreviations used in this table are as defined within text above.*

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