

EVALUATION OF THE REPRODUCTIVE PERFORMANCE OF THREE SELECTED RABBIT BREEDS (CHINCHILLA, DUTCH AND NEW ZEALAND WHITE DOES MATED WITH DUTCH BUCK

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Abstract

The study evaluated the reproductive performance of three rabbit breeds; New Zealand White, Chinchilla and Dutch. Rabbit animals were paired and a total of eighteen rabbits were used for the study. Findings revealed that average litter size at birth in the genetic groups NZW x DUT was between 6.40 ± 0.40 , while DUT x DUT was between 4.00 ± 0.45 and CHN x DUT was 5.60 ± 0.41 respectively. Average litter weight at birth of the NZW x DUT was 0.03 ± 0.08 , also the DUT x DUT was 0.04 ± 0.08 and CHN x DUT genetic group was 0.03 ± 0.07 . Average litter size at weaning in the genetic groups ranged from 3.40 ± 0.54 to 5.40 ± 0.64 , while average litter weight at weaning in all genetic groups ranged from 0.28 ± 0.03 to 0.38 ± 0.03 . Gestation period of the rabbit breeds used ranged from 28.80 ± 0.37 to 30.00 ± 0.32 days. CHN x DUT had the lowest average weight at birth and at weaning, DUT x DUT had the highest average weight at weaning. CHN x DUT, had the highest percentage survivability and NZW x DUT, had the highest percentage mortality. The study concluded that the chinchilla rabbit doe has a relatively better mothering ability and a highest survival rate. It was therefore recommended that farmers should adopt the cross breed of Dutch buck and New Zealand and Dutch Buck and Dutch does for better overall performance.

Keywords: Rabbit breeds (Chinchilla, Dutch, New Zealand White), reproductive performance,

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INTRODUCTION

The rabbit has been domesticated for several years and is adaptable to confinement rearing and close association with humans (Lebas *et al.*, 1986). According to Biobaku and Dosunmu (2003) and Fayeye and Ayorinde (2003), the increasing human population especially in developing countries coupled with inadequate supply of animal source of protein from the principal livestock species (cattle, sheep, goats, pigs and poultry) has made it imperative that attention be shifted to other micro-livestock such as rabbit. This is because rabbit production has the potential in alleviating the problem of inadequate animal protein supply in developing economies. This, according to Ghosh *et al.* (2008) is attributed largely to the rabbit's high rate of reproduction, early maturity, rapid growth rate, efficient food utilization and meat of high nutritional value. Its meat is highly digestible, wholesome, tasty and low in cholesterol, sodium and fat with high protein content (Herbert, 2011). Rabbits, because of the enormous benefits associated with their production, and with the belief that the unconventional livestock will certainly bridge the animal protein gap being 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. 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 (Odeyinka *et al.*, 2008. Among the available adaptable foreign breeds of rabbits reared for meat production in Nigeria are Chinchilla, Dutch and New Zealand white.

Rabbit farming is gaining momentum in Nigeria due to its high production potentials, high mothering ability, adaptability to a wide range of conditions, high genetic variability, high roughage utilization and low cost of production. Rabbit production appears as an attractive proposition for the supply of high quality meat. The increased livestock production can be achieved by rearing animals of short generation interval like rabbits by small scale farmers.

There is also paucity of information on the growth and reproductive efficiency of the available breeds in Nigeria. Therefore, the present study was undertaken to assess the growth and reproduction performances of Dutch, New Zealand white and Chinchilla breeds as influenced by breeds and parity in order to come out with the best strategies for improving the productivity of these rabbits in Nigeria. Consequently, the broad objective of the study was to evaluate the reproductive performance of Chinchilla, Dutch and New Zealand White does mated with Dutch buck.

MATERIALS AND METHODS

The experiment was carried out at the Rabbit Unit, Directorate of University Farm (DUFARMS), at Federal University of Agriculture Alabata road, Abeokuta. Alabata (70 10' and 30 2' E) is in Odeda Local Government Area of Ogun State Nigeria. Three breeds of rabbits Chinchilla, Dutch and New Zealand White were used for the study. A total number of 18 rabbits were used for this study. Out of the 18 rabbits, 5 were Chinchilla does, 5 Dutch does and 5 were New Zealand White does. The bucks were of the Dutch breed. The experimental animals were breeders. The does and the buck used for the research, which were 3 breeds of rabbit, were obtained from a reputable farm in Alabata, along Ogun – Osun road, Abeokuta, Ogun State. The breed for the buck were Dutch and the breeds for the does used were New Zealand White, Chinchilla and Dutch. The experimental animals used in the course of this project were raised under the intensive system of housing. The rabbit housed were made of wooden plank known as the hutch. Each of the bucks and the does occupied hutch singly and mating exercise occurred at the bucks' hutches. The experimental animals were supplied fresh, cool and clean water and both concentrate feed and forages were supply to them in the hutches respectively. The animals were fed such that, concentrated and pelletized feed were given in the morning while the forage harvested are given in the evening. Forages were harvested and spread early to get rid of microbes that might be ingested together with it. The ratio of does to buck were 1:5, because the breeding programme were hierarchic design in which several does were mated to one buck only.

Table 1: Mating Pattern involving the New Zealand White, Dutch and Chinchilla Breeds of Rabbit in Abeokuta, Nigeria.

Number of crossing	Sex		Resulting genotype or genetic group
	Buck	Doe	
	DUT	× NZW (5)	NZWDUT
	DUT	× DUT (5)	DUT
	DUT	× CHN (5)	CHNDUT

Source: Laboratory analysis results

* NZW= New Zealand White, DUT= Dutch, and CHN= Chinchilla rabbits
Number in parenthesis represents number of does used.

Management of pregnant does

The does, after mating and successive conception were prevented from mating. Prior to parturition (kindling), adequate preparations were made in terms of provision of kindling box. Good concentrate feed and forages, clean and cool water were made available.

Method of Data Collection

The newly kindled kittens from different genotypes were weighed on a weekly basis from week 1 to week 5 on a weighing scale. Litter size at birth and at weaning as well as litter weight at birth and at weaning, gestation period in each rabbit doe, percentage mortality during pre-weaning in each genetic group and percentage survivability till weaning were considered for each crossing. Data collected were descriptively analyzed.

Data collected include;

Average litter size at birth and weaning

Average litter weight at birth at weaning

Average gestation period

Percentage survivability at weaning

Percentage mortality

Litter Size: This is the number of newly born at birth and at weaning.

Litter Weight: this was recorded as the weight of kittens at 7days after birth and at weaning.

Gestation period: This is the period of time between mating and kindling.

Percentage Mortality (%): This is obtained by the ratio of the number of dead kittens to the total number of kittens multiplied by 100.

Percentage Survivability at weaning: 100 – % mortality.

Statistical analysis

Descriptive statistics were carried out on the data generated. All results were expressed as average and their standard error of means. Percentage survivability was depicted as %M. Average litter size at birth was depicted as ALS at B and average litter size at weaning was depicted as ALS at W. Also, average litter weights at birth and at weaning were depicted as ALW at B and at W respectively.

Results

The mating patterns involving the New Zealand White, Dutch and Chinchilla rabbit breeds, together with the result of the reproductive performance of these three breeds of rabbits were recorded. In the study conducted, the average mean litter size at birth in all the genetic groups ranged from 4.00 ± 0.45 to 6.40 ± 0.40 and average litter size at weaning in all the genetic groups ranged from 3.40 ± 0.54 to 5.40 ± 0.64 . Also, the average litter

weight at birth (kg) in all the genetic groups ranged from 0.03 ± 0.007 to 0.04 ± 0.08 and the average litter weight at weaning (kg) ranges from 0.28 ± 0.03 to 0.38 ± 0.03 . The percentage Mortality (%) ranges from 7.14 to 15.62, Percentage Survivability (%) ranges from 84.38 to 92.86 and the gestation period varied in the three genetic groups ranging from 28.8 ± 0.37 to 30.00 ± 0.32 days.

Outcome of crossing New Zealand White does with a Dutch buck

The New Zealand White does had the highest litter size at birth which has the value of 6.40 ± 0.40 , they also had the highest average litter size at weaning, they also have a moderate average litter weight at birth and at weaning. The genetic group NZWDUT had the highest percentage mortality and also the lowest survivability percentage alongside with a moderate gestation period among the genetic group

Outcome of crossing Dutch does with a Dutch buck.

The Dutch does have generally the lowest average litter size at birth, average litter size at weaning and average weight at birth. Also, they have highest average litter weight at weaning. Among the genetic groups the DUT had a moderate mortality and survivability percentage. The Dutch breed has the shortest gestation period among all the genetic groups having 28.8 ± 0.37 (days).

Outcome of crossing Chinchilla does with Dutch buck

The CHN × DUT genetic group had the highest average litter size at birth and average litter weight at birth among the genetic groups. The average litter size at weaning is moderate, coupled with the average litter weight at weaning which was the lowest of all; this genetic group had the longest gestation period. The Chinchilla breed mated with the Dutch buck has the lowest percentage mortality and of course has the highest survivability rate.

Discussion

This study showed that it is very viable to practice crossbreeding and inbreeding among rabbits breeds. The observation of the New Zealand does generally shows they have generally the highest litter size at birth and average litter size at weaning and moderate average litter weight at birth and at weaning, when crossed with the Dutch buck is in contrast with what had been reported by Sorensen *et al* (2001). Also, the observation that the gestation period of the New Zealand doe has a value of 29.80 ± 0.37 , corresponds favorably to the 28.10 which had been earlier reported by Odeyinka *et al* (2008), for some breeds of rabbits. Also the percentage mortality for NZW × DUT genetic group was 15.62%, which is in correlation and range of the 16 to 19% previously reported by Sorensen *et al* (2001) for breeds of rabbit. This could be as a result of poor mothering ability of the doe and also means that kits generated from this group needs proper handling, adequate balanced diet, favorable environmental conditions, proper management strategies and sound medications at all times in order to reduce the high rate of mortality among the kittens generated in the New Zealand White rabbit.

The observation that the DUT × DUT genetic group had a low average litter size at birth and low average size at weaning due to pre-weaning, due to pre-weaning mortality oscillates with what had been reported by Sorensen *et al* (2001) for rabbit breed. The range of values of the average litter weight at birth and at weaning were the highest for this genetic groups, and this genetic groups, and values were 0.04 ± 0.08 is in contrast to that 3.89 which was reported in literature by (Fayeye and Ayomide, 2012). The gestation period of this group was in the range of 28.8 ± 0.37 which was in agreement to that of 3.89 to 42.3 which was reported in literature by Odeyinka (2008) for some breeds of rabbit but oscillates with 28.8 to 32days for breeds of rabbit which is the standard gestation length of rabbits. Also the percentage mortality for this genetic group was 15.00% and it oscillates around 16 to 19% previously reported by Sorensen *et al* (2001). The observation that the CHN vs.

DUT genetic group had a moderate litter size at birth and at weaning, due to pre-weaning mortality which is in agreement with what had been reported by Sorensen *et al* (2001) for rabbit breeds, the fact that this genetic group also had a moderate average litter weight at birth but lowest average litter weight at weaning may be due to environment conditions and management techniques / strategies. The gestation period of this genetic group was 30.00 ± 0.32 , which was slightly greater than 28.10 ± 30.40 days, earlier proposed by Odeyinka *et al* (2008) for some breeds of rabbit, but in total agreement to the 28 to 32 days, which is the standard for all breeds of rabbits. Also, the percentage mortality for this genetic group was 7.14 which is greatly low to the 16 to 19% previously reported by Sorensen *et al* (2001). And the survivability rate of this breed is the highest.

Conclusion

When considering parameters such as litter size at birth and at weaning, litter weight at birth and at weaning, gestation period, percentage mortality and percentage survivability. This study also shows that Chinchilla rabbit doe has a relatively better mothering ability and it's the mother superior of the three different breeds. Also using the percentage survivability rate shows that the Chinchilla rabbit has small percentage mortality and of course the highest survival rate.

Recommendations

For increased rabbit production in Abeokuta Nigeria genetic grouping of NZW vs. DUT, DUT vs. DUT and CHN vs. DUT should be put into consideration due to the following facts;

Crossing Dutch buck with New Zealand White (cross-breeding) results in relatively high litter size at birth and average litter size at weaning. This is profitable for breeders who sell after weaning: more kittens to be sold thereby increasing the breeder's profit.

Crossing Dutch buck with a Dutch doe result in kittens with relatively high average weight and birth at weaning. This is profitable for farmers which sell their rabbits for meat purposes.

Crossing of Dutch buck and Chinchilla doe (cross breeding), this results in kitten from this genotypic cross having a relatively high survivability percentage and relatively small mortality, this depicts that the Chinchilla doe is the mother superior which encourages availability of rabbit to the farmer year-in-year-out thereby increasing profitability in the Rabbit enterprise.

References

- Biobaku, W.O. and Dosumo, E.O. (2003). Effects of supplementing a diet based maize and rice bran with 3 different improved forages on feed intake, digestibility and growth in rabbits. *NSAP*. 22:179-184.
- Biobaku W.O. and Dosunmu, E. O. (2003). Growth response of rabbits fed graded level of `processed and un- dehulled sunflower seed. *Nigerian Journal of Animal Production*. 30(2): 179-184.
- Fayeye, T. R and Ayorinde, K. L. (2003). Litter growth and weaning characteristics in two generations of straight- bred and crossbred rabbits. *Nigerian Journal of Genetics* 18: 68-72.
- Herbert, U. (2011). Unending seeds and waters of animal life. 12th Inaugural lecture series of Michael Okpara University of Agriculture, Umudike, Nigeria, Nov. 9:1-41.
- Odeyinka, S. M., Oyedele, O. J., Adeleke, T.O. and Odedire, J.A. (2008). Reproductive performance of rabbits fed *Moringaoleifera* as a replacement for *Centrosemapubescens*. *9th World Rabbit Congress Verona- Italy*, June 10-13: 411-416.
- Sorensen, P., Kjaer, J. B., Bruemce, U.T. and Su, G. (2001). Estimate Of genetics parameters in Danish white rabbit using an animal model in litter traits, *World Rabbit Science* 9(1): 33-38.

Table 2: Summary Statistics of the reproductive performance of New Zealand White, Dutch and Chinchilla does mated with Dutch buck in Abeokuta, Nigeria

Breeds of rabbit	Average litter size at birth (ALS at B)	Average litter size at weaning (ALS at W)	Average litter weight at birth (ALW at B) (kg)	Average litter weight at weaning (ALS at W) (kg)	Percentage Mortality (%)	Percentage Survivability (%)	Gestation Period (in days)
NZW	6.40 ± 0.40	5.40 ± 0.64	0.03 ± 0.08	0.31 ± 0.02	15.62	84.38	29.80 ± 0.37
DUT	4.00 ± 0.45	3.40 ± 0.54	0.04 ± 0.08	0.38 ± 0.03	15.00	85.00	28.80 ± 0.37
CHIN	5.60 ± 0.41	5.20 ± 0.45	0.03 ± 0.07	0.28 ± 0.03	7.14	92.86	30.00 ± 0.32

Source: Laboratory analysis results