

SOME OBSERVATIONS ON REPRODUCTIVE PERFORMANCE OF RABBITS OBTAINED IN SEMI-HUMID TROPICAL CONDITIONS IN NIGERIA

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ABSTRACT : Successful matings (139) of 7 bucks and 51 does were used to study the reproductive performance, during a four-years period, of rabbits crossbred comprising New Zealand White, Chinchilla, Dutch Black and Californian but whose exact genetic make-up is unknown. Mean litter size at birth and at weaning were 4.49 ± 0.15 and 3.18 ± 0.18 respectively. Gestation length ranged

from 28 to 36 days with a mean of 31.80 ± 0.11 days. Mean pre-weaning litter mortality was 27.9 ± 3.1 %. There was no significant effect of buck on all traits studied. However, litter size at birth and gestation length were significantly ($P < 0.05$) affected by year of kindling.

RESUME : Quelques observations sur les performances de reproduction de lapins élevés en climat tropical semi-humide au Nigeria.

Les saillies fécondes (139) de 7 mâles et 51 femelles, réparties sur quatre années, ont été utilisées pour étudier les performances de reproduction de lapins provenant de croisements non contrôlés des quatre races suivantes : Hollandais noirs, Néo-zélandais Blancs, Chinchilla, et Californien. La taille moyenne de la portée à la

naissance et au sevrage était de 4.49 ± 0.15 et 3.18 ± 0.18 respectivement. La durée de gestation était comprise entre 28 et 36 jours avec un moyenne de 31.80 ± 0.11 jours. La mortalité moyenne avant le sevrage était de 27.9 ± 3.1 %. L'effet du mâle sur les caractéristiques étudiées n'était pas significatif. Par contre, la taille de la portée à la naissance et la durée de gestation ont été significativement ($P < 0.05$) affectées par l'année de mise-bas.

INTRODUCTION

Rabbit farming in Nigeria is relatively new but it has the potential of making significant contribution to the country's meat supply. It involves a low-input, low-cost system and offers a very profitable small scale backyard production due to its size, efficiency and simplicity of management (RAJADEVAN *et al.*, 1987). SCHLOLAUT (1981) noted that rabbit's prolific breeding, early sexual maturity, relatively short gestation period, high number of litters by year (4-5) and relatively large litter size combined with its high growth rate, result in a meat production level that is greater than the performance of other herbivores. However, the high level of production recorded in developed countries are not always achieved in developing countries. Depressed growth rate and reproduction have been given as a major reason for poorer performance of rabbits in the tropics when compared to temperate regions (OWEN, 1976).

Inconclusive results have been obtained from attempts (RAJADEVAN *et al.*, 1987 ; ADESINA, 1988 ; ODUBOTE and SOMADE, 1992 ; OHIOSIMUAN *et al.*, 1994) to find out the true potentials of rabbits under prevailing tropical conditions. Also, because of the random and indiscriminate breeding practiced in most existing rabbitries in the tropics, the exact genetic make-ups of most available rabbits are unknown. The objective of the study, therefore, was to assess the reproductive performance of available rabbits under the sub-humid tropical condition of Makurdi, Nigeria.

MATERIALS AND METHODS

Location :

The data was obtained from the University of Agriculture, Makurdi Rabbitry (longitude $8^{\circ}31'E$,

latitude $7^{\circ}45'N$, 90m above sea level). Mean daily temperature of Makurdi varies from $15.6^{\circ}C$ in December/January to $38^{\circ}C$ in February/March with an annual average of $27.5^{\circ}C$. The area receives a well distributed rainfall of 1108mm during the rainy season (April to October) with a peak in July/August. The dry season (November to March) has little or no rain. Mean monthly relative humidity at 12.00GMT range from 66% to 84% in the rainy season and 15% to 40% in the dry season with a mean annual value of 60% (KOGBE *et al.*, 1978).

Animals :

Animals used in this study were rabbits comprising of New Zealand White, Chinchilla, Dutch Black and Californian blood established in 1992. The exact genetic make-up of the rabbits is unknown because of the random and indiscriminate breeding practiced in the rabbitry. No selection has been done among the stock. Successful mating (139) between 7 bucks and 51 does between August 1993 and December 1996 were used for this study. Matings were done in the mornings and the does were usually taken to the buck. Does and bucks were housed in cages measuring $8 \times 4 \times 2$ m (?) constructed on wooden frames-wire mesh supported on wooden poles some 1m above the ground. Cages had galvanized wire mesh floor and chicken wire mesh walls. Their roofs were of corrugated iron. They were under a huge tree which provided shade between 1993 to 1995. They were later moved to the North Core of the Campus, some 4km away, from their former location. In their new location, straws were heaped on the corrugated iron roof to a thickness of about six inches (15cm) to provide cooling in the absence of trees. Young rabbits were weaned at 28 days of age.

The rabbits were fed to appetite twice daily on 18% CP concentrate (consisting of crushed maize, full

Table 1 : Reproductive performance of rabbits.

Traits	n	Range	Mean ± SE	CV (%)
Litter size at birth (No)	139	1 - 9	4.49 ± 0.15	38.6
Litter size at weaning (No)	130	0 - 7	3.18 ± 0.18	63.0
Gestation length (days)	139	28 - 36	31.80 ± 0.11	4.17
Pre-weaning litter mortality (%)	130	0 - 100	27.9 ± 3.1	125

fat soybeans, vitamin-premix and salt) supplemented with fresh forage, mostly tridax. Water was always available to the animals. Reproductive and mortality traits studied included litter size at birth and at weaning, gestation length and preweaning litter mortality.

Data analysis

Data were analyzed by least square (HARVEY, 1990) fitting the model :

$$Y_{ijk} = \mu + S_i + T_j + e_{ijk}$$

where :

- Y_{ijk} = a performance record of an animal
- μ = grand mean
- S_i = effect of the i^{th} sire ($i = 1, \dots, 7$)
- T_j = effect of the j^{th} year ($j = 1, \dots, 4$)
- e_{ijk} = residual random error assumed normally distributed with mean zero and variance that of the population

Data for pre-weaning litter mortality was angularly transformed to stabilize the variance (SOKAL and ROHLF, 1981) before analysis. Means of effects which proved significance were compared using the Duncan multiple range test of STEEL and TORRIE (1980).

RESULTS AND DISCUSSION

Performance of the rabbits.

Table 1 presents the range and mean performance of rabbits. Mean litter size at birth and at weaning were 4.49 ± 0.15 and 3.18 ± 0.18 respectively. These values

were similar to those of OHIOSIMUAN *et al.* (1994). RAJADEVAN *et al.* (1987) and ODUBOTE and SOMADE (1992) for crossbred rabbits involving Chinchilla, California White and New Zealand White breeds in the tropics. Gestation length of the rabbits ranged from 28 to 36 days with a mean of 31.80 ± 0.11 days.

This value is consistent with other reports of between 29 to 33 days (SHLOLAUT, 1981 ; RAJADEVAN *et al.*, 1987 ; OHIOSIMUAN *et al.*, 1994 ; ODUBOTE and SOMADE, 1992). Mean pre-weaning litter mortality was $27.89 \pm 3.07\%$ (Table 1). This is lower than the value of 51.2% reported by RAJADEVAN *et al.* (1987) in Sri Lanka and agreed with the 29% reported by OHIOSIMUAN *et al.* (1994) in the humid tropics of Nigeria.

Effects of buck and year on the performance traits.

The results of the analysis of variance is presented in Table 2. There was no significant effect of buck on any of the performance traits contrary to ODUBOTE and SOMADE (1992) who reported significant buck effect on litter size at birth and at weaning of crossbred rabbits. However, our result was in agreement with those of PARTRIDGE *et al.* (1981) and KHALIL *et al.* (1988) who obtained no significant effect of buck on the traits. Significant ($P < 0.05$) effect of year of kindling was recorded for litter size at birth and gestation length but not for litter size at weaning and pre-weaning litter mortality (Table 2). Litters kindled in 1996 had significantly ($P < 0.05$) lower size at birth than other years (Table 3). There is no obvious explanation for this except that in 1995, 10 of the breeding does were lost to theft and a lot of foundation does were culled. Replacements were raised from within which could have raised the level of inbreeding in subsequent matings to a level significant enough to affect litter size at birth.

Tableau 2 : Analysis of variance results for the reproductive traits of rabbits.

Source	df	Traits							
		Litter Size at Birth		Litter Size at Weaning		Gestation length		Pre-weaning litter mortality ²	
		MS	F	MS	F	MS	F	MS	F
Buck	6	5.36	2.02 ^{n.s.}	5.85	1.50 ^{n.s.}	2.08	1.27 ^{n.s.}	1290.04	1.31 ^{n.s.}
Year	3	13.04	4.90**	5.13	1.32 ^{n.s.}	6.16	3.76*	291.98	0.30 ^{n.s.}
Error ¹		2.66 (129)		3.89 (120)		1.64 (129)		986.83(120)	

df = degree of freedom ; MS = mean square ; F = calculated F-statistic.
¹ = Values in parenthesis denotes degrees of freedom
² = Analysis was on angularly transformed data
 * = $P < 0.05$; ** = $P < 0.01$; ^{n.s.} = not significant.

Table 3 : Reproductive performance of rabbits by year.

	Means ^{1,2} ± SE by year			
	1993	1994	1995	1996
Litter size at birth (No)	4.71 ± 0.38 ^a (28)	4.88 ± 0.23 ^a (49)	4.67 ± 0.30 ^a (30)	3.53 ± 0.24 ^b (32)
Litter size at weaning (No)	3.68 ± 0.45 (19)	3.37 ± 0.33 (49)	3.13 ± 0.32 (30)	2.66 ± 0.30 (32)
Gestation length (days)	31.89 ± 0.33 ^{ab} (28)	31.78 ± 0.18 ^{ab} (49)	32.33 ± 0.15 ^b (30)	31.25 ± 0.22 ^a (32)
Pre-weaning litter mortality (%)	23.53 ± 4.81 (19)	30.92 ± 5.33 (49)	28.50 ± 5.99 (30)	25.00 ± 6.47 (32)

¹ Values in parenthesis are number of observation ;

² Values within row with different superscripts are significantly (P<0.05) different

CONCLUSION

The reproductive performance and mortality of rabbits reported here were generally within the range observed for tropical areas. These are considered adequate to improve the animal protein supply situation in Nigeria although there is room for improvement through management and selection. RAJADEVAN *et al.* (1987) and ODUBOTE and SOMADE (1992) had reported that most litter and weaning traits of rabbits are of medium to high heritabilities. However, since overall performance in a commercial rabbit enterprise is determined further by post-weaning performance of litter and young rabbits, the assessment of these should be done before a valid recommendation could be made about the viability of a commercial rabbit enterprise in the sob-humid tropics of Makurdi.

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