

Influence of genotypes and gestation length on body weight and linear body measurements of rabbits

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ABSTRACT

This study was carried out to investigate the effect of genotype and gestation length on body weight and linear body measurements of rabbits using crosses of Dutch belted (Dutch) (DUT) and New Zealand White (NZW) rabbits to generate four different genotypes namely : (DUT X DUT, NZW X NZW, DUT X NZW and NZW X DUT. Ninety nine progenies obtained from these crosses were used for the experiment. The body weight at 7, 21, 35, 42, 56, 70 and 84 days old was significantly ($p < 0.05$) influenced by genotype. The NZW X DUT crossbred had significantly higher body weight than two pure bred (NZW X NZW) and (DUT X DUT) and the (DUT X NZW) cross. Gestation length significantly ($p < 0.05$) affected body weight across the weeks considered. Genotype significantly ($p < 0.05$) affected ear length at 56, 70 and 84 days old.

Keywords: Genotypes, Gestation length, Body weight and Linear Measurements

INTRODUCTION

Rabbits have been proved to have very high efficiency in the production of meat compared to other farm animals (Aduku and Olukosi, 1990). Rabbit production is gradually becoming an essential source of income and employment generation in Nigeria. It can also serve as a cheap source of animal protein in order to prevent the negative effects of malnutrition among infants and adults which are prevalent in developing countries (Mc Nitt *et al.*, 2000). Rabbit meat also serves as a cheap source of meat which is characterized by high protein and low fat cholesterol contents (Aduku and Olukosi, 1990). As a result of this, rabbit as a farm animal can be considered as an alternative source of animal protein.

Gestation period of rabbit does is an indicator influenced by different factors. The length of gestation could be affected by the

season of the year (Marai *et al.*, 2004; Tuma *et al.* , 2010) also provided estimates of phenotypic correlations between reproductive traits (gestation length and birth weight) in purebred rabbits. According to (Marai and Rashwan, 2004) gestation length was not significantly correlated with litter size and kitted birth weight.

Body weight is referred to as a function of framework or size of the animal and its condition. It should be noted that differences observed in body weight within a flock can be attributed to genetic variation and environmental factors that impinge on individual (Ayorinde and Oke, 1995). Body weight is known to be highly heritable and hence the selection of heavier individuals in a population should result in genetic improvement of the traits. According to Castellini *et al.*, 2003, the post birth body

weight of rabbit kits is significantly influenced by litter size at birth due to the fact that the relative share of milk per kit decreased as the litter size increased. Ibrahim *et al.*, 2003, reported a significant increase in pre weaning mortality for kits born in large litter in New Zealand White and other breeds of rabbits.

MATERIALS AND METHODS

The study was conducted at the Rabbitary unit of Department of Animal Science, University of Port Harcourt Demonstration Farm (Livestock Section) Choba campus, Rivers State. The Campus is located at latitude 4.8943N and Longitude 6.91053 E and the altitude is 16m.

Experimental Animals and Management

Two breeds of rabbits were used for this experiment, these include New Zealand White (NZW) and Dutch. These breeds were used to generate four different genotypes namely; Pure bred (NZW X NZW and DUT X DUT) and their reciprocal crosses (NZW X DUT and DUT X NZW). Total of twenty does (i.e. 10 Dutch and 10 New Zealand White) of 15 to 18 months old and four bucks (2 Dutch and 2 New Zealand White) were used for the experiment. These crosses generated a total of ninety nine progenies. The rabbits were fed with conventional pelleted grower's feed and forages such as *Calopogonium mucunoides* and *Panicum maximum ad libitum*. Drinking water was also given to them ad libitum. Other daily routine management practices were also observed. The rabbits were housed in cages and kindling boxes were provided for the pregnant does three days before the kindling date. The kittens were weaned at 56 days of age.

DATA COLLECTION

Body weight of rabbits was taken using top loading weighing scale while, linear body measurements were taken using measuring tape on weekly basis. Likewise, record of gestation length was also taken.

Body length was measured using measuring tape from the tip of the nose to the beginning of the tail. Ear length was measured from the point of attachment of the ear close to the skull to the tip of the ear. Tail length was measured from the end of the keel to the tip of the tail. Fore limb was measured from the joint of the shoulder to the tip of the claw. Hind limb length was taken from the pelvic girdle to the claw of the hind limb.

DATA ANALYSIS

Mean \pm Standard deviation of the body weight and linear measurements (such as body length, fore limb length, hind limb length, ear length and tail length) at various ages by genotype and gestation length were analysed using the General Linear Model of SAS (2001).

The Linear model is as presented below;

$$Y_{ijkl} = U + G_i + D_k + e_{ijkl}$$

Where Y_{ijkl} = Record of the dependent variable

U = Overall mean

G_i = Effect of the i^{th} genotype ($i = 1 - 4$)

D_k = Effect of the k^{th} gestation length ($k = 1 - 5$)

e_{ijkl} = Random error effect

RESULTS

Effect of Genotype and Gestation Length on Body Weight of Rabbits

The effect of genotype and gestation length on the body weight of rabbits is shown on Table 1. Genotype significantly ($P < 0.05$) affected body weight and this varied from week 1 to week 12. There was no significant difference at week 1 but at week 2. NZW X Dutch crosses had higher body weight ($218.43 \pm 8.44\text{g}$) than other genotype. This was closely followed by NZW X NZW crosses ($198.59 \pm 12.59\text{g}$) and then Dutch x Dutch crosses ($186.46 \pm 16.55\text{g}$). Dutch x NZW crosses had the lowest body weight ($176.92 \pm 15.36\text{g}$). This trend was seen till week 6 when Dutch x Dutch over weighed NZW X NZW and this was maintained till the end of the research.

The effect of gestation length on the body weight of rabbits is shown in Table 1. Gestation length significantly affected body weight across the weeks. Body weight increased with increasing gestation length. At week 12, gestation length of 32 days had the highest body weight of $1041.43 \pm 44.34\text{g}$. This was closely followed by gestation length of 34 days with mean body weight of $1010 \pm 38.22\text{g}$. Next to this was gestation length 33 days with mean body weight of $945 \pm 65.98\text{g}$. The least body weight was observed in 28 days of gestation length ($914.29 \pm 27.45\text{g}$).

Effect of Genotype and Gestation Length on the Body Length of Rabbits

The effect of genotype and gestation length on body length of rabbits is shown in Table 2. Significant differences in body length were observed at week 3, 5 and 10. At week 10, Dutch x Dutch crosses were significantly

longer ($36.41 \pm 0.53\text{cm}$) when compared to other crosses. This was followed by NZW X Dutch crosses having a body length of $36.18 \pm 0.44\text{cm}$ and then Dutch x NZW (35.58 ± 0.88). The least body weight was observed in NZW X NZW crosses ($34.97 \pm 0.44\text{cm}$).

The effect of gestation length on the body length of rabbits is shown in Table 2. Significant differences of body length were observed due to gestation length of rabbits. At week 12, rabbits with gestation length 32 had the highest body length ($38.71 \pm 3.13\text{cm}$). This was closely followed by rabbits with gestation length 31 (37.70 ± 0.37), 33 ($37.03 \pm 0.81\text{cm}$) and 34 ($36.15 \pm 2.93\text{cm}$). The least body length was observed in rabbits with gestation length 28 ($35.86 \pm 0.40\text{cm}$).

Table 1: Mean \pm SEM of Effect of Genotype and Gestation Length on Body Weight (g) of Rabbits

Factors	N	7days	21days	35days	42days	56days	70days	84days	
Genotype									
DUT XDUT	23	75.97±3.41 ^a	186.46±16.55	377.08±23.21 ^b	482.29±27.97 ^a	596.74±39.21 ^b	847.83±31.39 ^a	1047.83±28.02 ^a	
DUT X NZ	13	76.0±4.75 ^a	176.92± 15.35 ^b	292.31±20.68 ^c	396.15±32.74 ^b	502.31±25.17 ^c	728.84±36.89 ^b	841.67±43.88 ^b	
NZW XNZW	32	76.23±2.17 ^a	198.59±12.59 ^{ab}	378.38±16.24 ^b	475.00±19.42 ^a	598.94±31.25 ^a	797.03±40.36 ^{ab}	954.19±42.74 ^a	
NZW X DUT	31	80.81±2.10 ^a	218.43±8.44 ^a	427.34±17.83 ^a	536.25±18.43 ^a	699.31±24.79 ^a	887.09±41.32 ^a	1052.42±35.57 ^a	
Gestation									
28	14	61.69±0.65 ^c	132.14±22.85 ^a	246.43±11.97 ^b	351.79±10.55 ^b	446.43±17.55 ^a	696.43±26.58 ^b	914.29±27.45 ^a	
31	24	90.70±1.15 ^a	185.58±9.00 ^a	390.4±11.64 ^a	482.0±10.93 ^a	626.04±10.93 ^a	834.38±24.76 ^a	992.71±28.05 ^a	
32	36	70.11 ±2.56 ^b	226.92±13.82 ^a	396.52±17.46 ^a	513.06±34.98 ^a	651.53±34.98 ^a	897.91±38.34 ^a	1041.43±44.34 ^a	
33	16	91.08±3.69 ^c	206.0±11.92 ^a	416.94±28.19 ^a	511.88±12.57 ^a	624.38±42.57 ^a	802.0±62.79 ^b	945.0±65.98 ^a	
34	10	68.33±2.97 ^a	210.0±16.27 ^a	440.0±31.67 ^a	545.0±23.34 ^a	698.0±33.34 ^a	785.0±82.00 ^a	1010.0±38.2 ^a	
Overall	99	77.52±1.20 ^a	199.68±6.03 ^a	382.42±10.44 ^a	485.99±12.18 ^a	617.80±17.05 ^a	828.08±20.80 ^a	993.87±20.82 ^a	
abc,	means	within	the	same	column	carrying	different	superscripts	differ significantly (p<0.05)

Table 2: Mean \pm SEM of Effect of Genotype and Gestation Length at 21, 35,42,56,70 and 84 days on body length (cm) of Rabbits

Factors							
	N	21 Days	35days	42days	56days	70days	84days
Genotype							
DUT X DUT	23	22.05 \pm 0.64 ^a	26.73 \pm 0.58 ^{ab}	31.25 \pm 0.41 ^a	34.46 \pm 0.48 ^a	36.41 \pm 0.53 ^a	38.52 \pm 0.30 ^a
DUT X NZW	13	19.69 \pm 0.60 ^b	24.77 \pm 0.50 ^c	28.23 \pm 0.66 ^a	31.50 \pm 0.48 ^a	35.58 \pm 0.88 ^{ab}	36.33 \pm 0.80 ^a
NZW X NZW	32	21.78 \pm 0.44 ^a	26.57 \pm 0.53 ^b	29.68 \pm 0.69 ^a	33.25 \pm 0.36 ^a	34.97 \pm 0.44 ^{ab}	36.77 \pm 0.53 ^a
DUT X DUT	31	23.17 \pm 0.58 ^a	28.25 \pm 0.52 ^a	30.98 \pm 0.57 ^a	32.97 \pm 0.39 ^a	36.18 \pm 0.44 ^{ab}	38.06 \pm 1.02 ^b
Gestation Length							
28	14	18.71 \pm 0.37 ^b	24.64 \pm 0.48 ^b	32.11 \pm 0.50 ^a	32.11 \pm 0.50 ^a	33.46 \pm 0.37 ^{ab}	35.86 \pm 0.40 ^{ab}
31	24	23.19 \pm 0.58 ^{bc}	26.74 \pm 0.58 ^c	33.35 \pm 0.48 ^b	37.56 \pm 0.29 ^b	36.29 \pm 0.39 ^{ab}	37.70 \pm 0.37 ^{ab}
32	36	22.01 \pm 0.47 ^a	27.48 \pm 0.49 ^a	31.91 \pm 0.37 ^a	33.35 \pm 0.48 ^a	30.54 \pm 0.48	38.71 \pm 3.13 ^a
33	16	22.80 \pm 0.64 ^a	22.92 \pm 0.86 ^a	32.20 \pm 0.55 ^a	33.19 \pm 0.36 ^a	36.02 \pm 0.73 ^a	37.03 \pm 0.81 ^{ab}
34	10	22.17 \pm 1.16 ^a	26.55 \pm 0.78 ^a	47.56 \pm 0.93 ^a	32.20 \pm 0.54 ^a	34.52 \pm 0.68 ^b	36.15 \pm 2.93 ^{ab}
Overall	99	22.03 \pm 0.30 ^{bc}	26.90 \pm 0.29 ^{abc}	30.19 \pm 0.32 ^b	34.40 \pm 3.09 ^a	35.76 \pm 0.26 ^{ab}	37.55 \pm 0.39 ^a

abc, means within the same column carrying different superscripts differ significantly (p<0.05)

Effect of Genotype and Gestation Length on Ear Length of Rabbits

The effect of genotype and gestation length on ear length of rabbits is shown in Table 3 below. Breed significantly ($p<0.05$) affected ear length at weeks 5, 10 and 12. At week 5, 10 and 12. At week 12, Dutch x DUTCH crosses had the highest ear length ($10.67\pm0.10\text{cm}$). This was followed by NZW X Dutch crosses ($10.46\pm0.11\text{cm}$) and then NZW X NZW crossed ($10.32\pm0.15\text{cm}$). The least ear length was observed in Dutch x NZW crosses ($10.08 \pm 0.08\text{cm}$).

Ear length was affected significantly ($p<0.05$) by the gestation length of the rabbits. At week 12, the highest ear length was observed in gestation length of 32 days ($10.76\pm0.11\text{ cm}$). This was followed by gestation length of 28 days (10.56 ± 0.16) and then gestation length of 31 days ($10.29\pm0.07\text{cm}$). The least ear length was observed in gestation length of 33 days ($9.88\pm0.19\text{cm}$).

Effect of Genotype and Gestation Length on Forelimb of Rabbits

The variation in fore limb length of rabbits due to genotype and gestation length is shown in Table 4 below. Genotype significantly ($p<0.05$) affected the forelimb of rabbits. At week 12, Dutch x Dutch crosses had the highest value of forelimb ($18.39\pm0.34\text{cm}$). This was followed by NZW X Dutch crosses with a mean forelimb length of $17.75\pm0.28\text{cm}$. This least value was observed in Dutch x NZW crosses ($15.83\pm0.32\text{cm}$).

The effect of gestation length on forelimb length of rabbits is shown in Table4. A significant ($p<0.05$) variation was also observed. At week 12, the highest forelimb

was observed at gestation length 33($16.04\pm0.39\text{cm}$) and 34 ($16.95\pm0.31\text{cm}$).

Table 3: Mean \pm SEM of Effect of Genotype and Gestation Length at 21, 35, 42, 56, 70 and 84 days on ear length (cm) of Rabbits

Factors	N	21 days	35 days	42 days	56 days	70 days	84 days
Genotype							
DUT X DUT	23	5.53 \pm 0.18 ^{ab}	7.69 \pm 0.16 ^b	8.42 \pm 0.14 ^a	9.39 \pm 0.12 ^{ab}	9.98 \pm 0.11 ^b	10.67 \pm 0.10 ^a
DUT X NZW	13	5.62 \pm 0.15 ^a	7.5 \pm 0.12 ^a	8.23 \pm 0.12 ^a	9.08 \pm 0.16 ^a	8.97 \pm 0.74 ^b	10.08 \pm 0.08 ^c
NZW X NZW	32	5.40 \pm 0.16 ^a	7.79 \pm 0.0 ^b	8.41 \pm 0.13 ^a	9.01 \pm 0.17 ^a	9.60 \pm 0.13 ^a	10.32 \pm 0.15 ^{bc}
NZW X DUT	31	7.18 \pm 1.03 ^a	8.21 \pm 0.09 ^a	8.41 \pm 0.14 ^a	9.35 \pm 0.12 ^a	9.98 \pm 0.12 ^a	10.46 \pm 0.11 ^a
Gestation Length							
28	14	5.19 \pm 0.13 ^b	7.39 \pm 0.11 ^b	8.92 \pm 0.15 ^a	8.93 \pm 0.15 ^a	9.57 \pm 0.14 ^{ab}	10.56 \pm 0.16 ^{ab}
31	24	5.84 \pm 0.22 ^b	8.00 \pm 0.15 ^a	9.33 \pm 0.11 ^a	9.34 \pm 0.11 ^a	9.93 \pm 0.12 ^a	10.56 \pm 0.16 ^a
32	36	5.75 \pm 0.12 ^b	7.94 \pm 0.10 ^a	9.44 \pm 0.11 ^a	9.44 \pm 0.11 ^a	9.77 \pm 0.16 ^a	10.76 \pm 0.11 ^a
33	16	5.75 \pm 0.25 ^b	7.75 \pm 0.17 ^a	8.83 \pm 0.31 ^a	8.83 \pm 0.31 ^a	9.34 \pm 0.17 ^b	9.88 \pm 0.19 ^b
34	10	8.71 \pm 3.03 ^a	8.05 \pm 0.16 ^c	9.12 \pm 0.20 ^{bc}	9.12 \pm 0.20 ^{ab}	9.89 \pm 0.2 ^{ab}	10.1 \pm 0.18 ^a
Overall	99	6.0 \pm 0.33 ^a	7.85 \pm 0.06 ^a	8.39 \pm 0.07 ^b	9.21 \pm 0.07 ^{ab}	9.76 \pm 0.07 ^{ab}	10.41 \pm 0.06 ^a

abc, means within the same column carrying different superscripts differ significantly (p<0.05)

Table 4: Mean \pm SEM of Effect of Genotype and Gestation length at 21, 35,42,56,70 and 84 days on forelimb length (cm) of rabbits

Factors	N	21days	35days	42days	56days	70days	84days
Genotype							
DUT X DUT	23	8.10 \pm 0.36 ^{ab}	11.02 \pm 0.36 ^b	12.4 \pm 0.51 ^b	14.0 \pm 0.44 ^a	16.10 \pm 0.43 ^a	18.39 \pm 0.34 ^a
DUT X NZW	13	7.3 \pm 0.20 ^b	10.03 \pm 0.22 ^c	10.98 \pm 0.31 ^c	14.15 \pm 0.38 ^a	14.80 \pm 0.87 ^b	15.83 \pm 0.32 ^c
NZW X NZW	32	8.08 \pm 0.29 ^a	11.90 \pm 0.34 ^a	12.40 \pm 0.31 ^a	14.61 \pm 0.26 ^a	15.86 \pm 0.33 ^{ab}	17.06 \pm 0.29 ^b
NZW X DUT	31	8.86 \pm 0.30 ^a	12.00 \pm 0.34 ^a	13.24 \pm 0.31 ^a	14.62 \pm 0.36 ^a	16.90 \pm 0.38 ^a	17.75 \pm 0.28 ^{ab}
Gestation length							
28	14	6.89 \pm 0.17 ^b	10.07 \pm 0.42 ^b	10.45 \pm 0.32 ^a	14.57 \pm 0.20 ^a	14.11 \pm 0.34 ^a	17.07 \pm 0.45 ^b
31	24	7.94 \pm 0.23 ^a	10.8 \pm 0.21 ^b	12.51 \pm 0.35 ^a	14.89 \pm 0.21 ^a	16.29 \pm 0.40 ^{ab}	17.42 \pm 0.26
32	36	8.92 \pm 0.25 ^a	2.95 \pm 0.66 ^a	13.61 \pm 0.32 ^a	14.44 \pm 0.40 ^a	17.31 \pm 0.39 ^a	18.31 \pm 0.32 ^a
33	16	8.29 \pm 0.49 ^a	12.1 \pm 3.94 ^a	12.37 \pm 0.43 ^a	14.06 \pm 0.54 ^a	15.5 \pm 0.49 ^{bc}	16.04 \pm 0.39 ^c
34	10	8.16 \pm 0.67 ^a	10.33 \pm 1.02 ^b	11.39 \pm 0.23 ^a	13.49 \pm 0.49 ^a	14.95 \pm 0.41 ^{cd}	16.95 \pm 0.31 ^b
Overall	99	8.24 \pm 0.16 ^a	11.49 \pm 0.18 ^a	12.49 \pm 0.19 ^a	14.41 \pm 0.18 ^a	16.10 \pm 0.22 ^a	17.44 \pm 0.17 ^a

abcd, means within the same column carrying different superscripts differ significantly (p<0.05)

Effect of Genotype and Gestation Length on Hind Limb of Rabbits

The variation in hind limb length of rabbits due to genotype and gestation length is shown in Table 5. Genotype significantly ($p < 0.05$) affected the hind limb of rabbits. At weeks 12, Dutch x Dutch crosses had the highest value of hind limb length (24.98 ± 0.34 cm). This was followed by NZW X Dutch crosses with a mean hind limb length of (24.62 ± 0.26 cm). The least value was observed in Dutch x NZW crosses (23.21 ± 0.35 cm). This is the same trend observed in the variation of forelimb length across the variation of fore limb length across the various genotypes used in this study.

The effect of gestation length on fore limb length of rabbits is shown in Table 5. A significant ($p < 0.05$) variation was observed in week 3, 5 and 10. At week 12, there was no significant difference but the highest hind limb length was observed at gestation length 32 with a mean length of 24.5 ± 0.29 cm. The

least value was observed in gestation length 33 (23.94 ± 0.36 cm).

Effect of Genotype and Gestation Length on Tail Length of Rabbits

The effect of genotype and gestation length on tail length of rabbits is shown in Table 6. Genotype significantly ($p < 0.05$) affected tail length at week 3, 5, 10 and 12. At week 12, NZW X Dutch crosses had the highest tail length (8.05 ± 0.15 cm). There was no significant difference ($p < 0.05$) between the other crosses. However, Dutch x Dutch crosses had higher values of tail length (7.96 ± 0.11 cm).

Tail length was affected significantly ($p < 0.05$) by the gestation length of the rabbits for week 5, 10 and 12. At week 12, the highest ear length was observed in gestation length of 32 days (7.99 ± 0.15 cm). This was followed by gestation length of 34 (7.70 ± 0.35 cm) and then 31 days (7.69 ± 0.20 cm). The least tail length was observed in gestation length of 33 days (7.16 ± 0.32 cm).

Table 5: Mean \pm SEM of Effect of Genotype and Gestation Length at 21, 35,42,56,70 and 84 days on hindlimb length(cm) of Rabbits

Factors								
	N	21days	35days	42days	56days	70days	84days	
Genotype								
DUT X DUT	23	13.32 \pm 0.40 ^b	16.32 \pm 0.42 ^b	18.20 \pm 0.48 ^a	20.97 \pm 0.34 ^a	23.35 \pm 0.28 ^a	24.98 \pm 0.22 ^a	
DUT X NZW	13	12.80 \pm 0.18 ^b	15.80 \pm 0.47 ^b	16.62 \pm 0.32 ^b	18.69 \pm 0.26 ^a	22.15 \pm 0.41 ^c	23.21 \pm 0.35 ^b	
NZW X NZW	32	13.05 \pm 0.29 ^a	16.57 \pm 0.22 ^b	18.25 \pm 0.22 ^a	18.25 \pm 0.22 ^a	20.74 \pm 0.28 ^a	23.68 \pm 0.19 ^b	
NZW X DUT	31	14.34 \pm 0.20 ^a	17.59 \pm 0.24 ^a	18.82 \pm 0.2 ^a	19.94 \pm 0.56 ^a	23.15 \pm 0.37 ^a	24.62 \pm 0.26 ^a	
Gestation								
Length	28	14	12.0 \pm 0.32 ^c	14.71 \pm 0.31 ^c	16.02 \pm 0.22 ^a	18.93 \pm 0.29 ^a	22.11 \pm 0.28 ^{bc}	24.14 \pm 0.35 ^a
	31	24	13.53 \pm 0.25 ^{ab}	16.51 \pm 0.29 ^b	18.69 \pm 0.29 ^a	21.33 \pm 0.33 ^a	23.88 \pm 0.16 ^a	24.10 \pm 0.12 ^a
	32	36	14.14 \pm 0.25 ^a	17.58 \pm 0.24 ^a	18.72 \pm 0.29 ^a	20.97 \pm 0.34 ^a	22.96 \pm 0.36 ^{ab}	24.5 \pm 0.22 ^{ab}
	33	16	13.04 \pm 0.45 ^b	16.85 \pm 0.39 ^{ab}	18.38 \pm 0.38 ^a	18.93 \pm 0.88 ^a	21.76 \pm 0.28 ^c	23.94 \pm 0.36 ^{ab}
	34	10	13.79 \pm 0.43 ^{ab}	16.9 \pm 0.44 ^{ab}	17.95 \pm 0.30 ^a	19.33 \pm 0.51 ^a	21.82 \pm 0.70 ^{bc}	24.1 \pm 0.49 ^{ab}
Overall	99		13.49 \pm 0.16 ^a	16.73 \pm 0.16 ^a	18.21 \pm 0.17 ^a	20.28 \pm 0.22 ^a	22.76 \pm 0.17 ^a	24.22 \pm 0.13 ^a

abc, means within the same column carrying different superscripts differ significantly (p<0.05)

Table 6: Mean \pm SEM of Effect of Genotype and gestation length at 21,35,42,56,70 and 84 days on Tail Length (cm) of Rabbits

Factors							
	N	21 days	35 days	42 days	56 days	70 days	80 days
Genotype							
DUT X DUT	23	3.16 \pm 0.13 ^a	4.39 \pm 0.19 ^{bc}	5.29 \pm 0.20 ^{ab}	6.27 \pm 0.20 ^a	8.24 \pm 0.20	7.96 \pm 0.11
DUT X NZW	13	3.30 \pm 0.18 ^b	4.10 \pm 0.18 ^b	7.73 \pm 3.19 ^a	5.84 \pm 0.24 ^{ab}	7.53 \pm 0.24 ^b	7.12 \pm 0.13 ^b
NZW XNZW	32	3.20 \pm 0.10 ^b	4.79 \pm 0.15 ^a	5.29 \pm 0.22 ^a	6.33 \pm 0.19 ^{ab}	7.90 \pm 0.16 ^b	7.40 \pm 0.23 ^b
NZW X DUT	31	3.82 \pm 0.12 ^a	5.29 \pm 0.17 ^a	5.72 \pm 0.15 ^a	6.94 \pm 0.18 ^a	9.37 \pm 0.68 ^b	8.05 \pm 0.15 ^a
Gestation							
28	14	2.74 \pm 0.12 ^a	4.07 \pm 0.12 ^c	5.47 \pm 0.29 ^a	5.46 \pm 0.13 ^a	7.60 \pm 0.25 ^{ab}	7.61 \pm 0.16 ^{ab}
31	24	3.3 \pm 0.14 ^a	4.76 \pm 0.23 ^{ab}	5.71 \pm 0.26 ^a	6.32 \pm 0.20 ^a	7.69 \pm 0.09 ^{ab}	8.70 \pm 0.20 ^{ab}
32	36	3.79 \pm 0.06 ^a	5.27 \pm 0.15 ^a	5.68 \pm 0.15 ^a	7.04 \pm 0.13 ^a	9.08 \pm 0.59 ^a	7.99 \pm 0.15 ^a
33	16	3.3 \pm 0.23 ^{ab}	4.72 \pm 0.20 ^{ab}	5.07 \pm 0.28 ^a	6.55 \pm 0.37 ^a	7.63 \pm 0.17 ^{ab}	7.16 \pm 0.32 ^{ab}
34	10	3.20 \pm 0.19 ^{bc}	4.33 \pm 0.22 ^{bc}	4.70 \pm 0.16 ^a	5.77 \pm 0.23 ^a	7.40 \pm 0.43 ^{ab}	7.7 \pm 0.35 ^{ab}
Overall	99	3.40 \pm 0.04 ^a	4.79 \pm 0.09 ^a	5.74 \pm 0.41 ^a	6.44 \pm 0.10 ^a	8.39 \pm 0.22 ^a	7.70 \pm 0.09 ^a

abc, means within the same column carrying different superscripts differ significantly (P>0.05)

DISCUSSION

The effect of genotype and gestation length of rabbits on body weight was observed in this study. The results obtained are similar to those reported by Oke *et al.* (2010) and Isaac *et al.* (2010), where they observed significant difference in growth traits among genotypes of rabbits. The present study contradicts the findings of Ozimba and Lukefahr (1991) and Roberts and Lukefahr (1992) who asserted that there was small to non-significant breed differences for postweaning growth traits in breed comparison studies involving three breeds. Likewise, significant influence of genotypes and gestation length was also observed among the body weight and other linear parts of the animal studied. Differences in body weight within a flock can be attributed to genetic variation and non-genetic (environmental) factors that impinge on individual (Ayorinde and Oke 1995). Body weight is regarded as a function of framework or size of the animal and its condition. Body weight is also known to be highly heritable and hence the selection of heavier individuals in a population should result in genetic improvement of the traits. The progenies from the four genotypes however, increased in body size and other body dimensions as the animals grew in age

The effect of the season on reproductive performance of rabbits could be different in does and in growing rabbits Castellini *et al.* (2003) described the highly influential effect of the season on gestation period, kindling interval and litter weight at weaning. Bhatt *et al.* (2002) found that litter size and weight at birth, litter size at weaning as well as litter weight at weaning were all higher during winter as compared to those during summer and the rainy season. Similar results were

reported by Kumar *et al.* (2005) in Angola rabbits. As rabbit reproduction is affected by season, the effect of the season has also been revealed in weight gain. McNitt *et al.* (2000) reported a significant impact of the season on the growth of rabbits, with the lowest gain in summer.

The results on body length in this study are consistent with other reports. Piles *et al.* (2000) and Shahin and Hassan (2002) documented that selection for high growth rate in rabbit had improved slaughter performance, but that it carries a high risk of lowering the quality of meat. There are genetic and environmental factors affecting the post weaning growth rate of rabbits, and these include breed (Lukefahr *et al.*, 1983), sex (Afifi *et al.*, 2000), season or month (Afifi and Emara, 1990).

The results on other linear body parameters like ear length, fore limb length, hind limb length and tail length of these rabbits are also in agreement with the reports of Oke *et al.* (2010) and Isaac *et al.* (2010) who also observed significant difference in growth traits among breeds of rabbits

CONCLUSION

This study has clearly revealed that genotype and gestation length significantly influence body weight, body length, ear length, fore limb and tail length of rabbits. Likewise, reciprocal crosses (NZW X DUT) performed better than pure bred (DUT X DUT as well as NZW X NZW). Therefore, the reciprocal crosses (NZW X DUT) should be adopted to improve rabbits production among farmers for optimum performance. In addition, variation in growth rate or weight gain of rabbit within the same genotype or among different genotypes observed could be attributed to environmental factors such

as nutrition, disease, hormone and general management.

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