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Influence of Weaning Age on the Linear Body Traits of Rabbit Genotypes in a Tropical Rain-forest Zone of Nigeria.

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Abstract

This study investigated the effect of age at weaning on linear body traits of different rabbit genotypes namely – New Zealand White (NZW), Chinchilla (CHN), NZW x CHN and CHN x NZW. Weaning ages considered across the genotypes were days 28 (W28), 42 (W42) and 56 (W56). Data were collected from each genotype on body length, heart girth, head-to-shoulder, shoulder-to-tail, length of hind limb and tail drop for 7 weeks for each weaning age. A total of 80 kits (20 each of the genotypes) were measured. A completely randomized design was used for the study. The analysis of variance showed that there were significant differences ($P < 0.05$) among the different weaning ages on the linear traits. Kits weaned at day 28 had significantly ($P < 0.05$) higher values for virtually all the linear traits studied followed by those weaned at 42 days and then 56 days. At the final week of measurement body length ranged from 64.48 ± 0.78 – 67.08 ± 0.55 (W28), 42.68 ± 0.32 – 54.13 ± 1.83 (W42) and 36.00 ± 0.09 – 37.16 ± 0.22 (W56), head-to-shoulder 12.98 ± 0.27 – 13.86 ± 0.13 (W28), 10.20 ± 2.36 – 11.76 ± 0.33 (W42) and 9.13 ± 0.17 – 9.52 ± 0.09 (W56), heart girth 15.30 ± 0.07 – 15.52 ± 0.07 (W28), 13.91 ± 0.06 – 14.73 ± 0.19 (W42) and 13.22 ± 0.05 – 13.44 ± 0.08 (W56) amongst others. Results of this study therefore suggest that kits can be weaned at 28 days without any adverse effect on the linear body traits within the zone under consideration.

Keywords: Weaning Age, Linear Body Traits, Genotype, Rabbit, Nigeria

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Introduction

Linear body traits of meat animals like the rabbit gives an indication of their live-weight gain, skeletal size, reproductive performance and carcass characteristics (Ebegbulem and Okon, 2012). They are, therefore, very highly supportive tools for evaluation of rabbit meat production and overall productivity. These traits had also been used to evaluate relationships between heredity and environment and such studies had found useful application in selection and breeding (Owojori *et al*., 2011). It then means that these traits are subject to variations due to genotypic and management factors. Such management factors include weaning traits. Oshinowo, *et al*., (1993) reported that weaning age, weaning weight and weaning rate influenced herd productivity in goat population. In the domestic rabbit, studies have identified weaning age among others as influencing post-weaning growth performance (Afifi and Emara, 1988; McNitt and Lukfahr, 1996). Effects of different ages at weaning on the reproductive, litter and caecal performance have also been reported. Nuria *et al*. (2002) found that rabbits weaned at 25 days of age had shorter parturition interval (39.9 vs 44.4), higher prolificacy (9.07 vs 8.11), increased litter size at 21 days (8.24 vs 7.51) and weaning (8.21 vs 7.42) and reduced number of kits born dead (0.52 vs 0.94) when compared to those weaned at 35 days of age. In another experiment, Xicatto *et al*. (2000) observed that early weaning of young rabbits could permit increased reproduction rate without negative effects on litters and does. Early weaning has also been reported to reduce pathogen transmission between litters and does. Effects of weaning age on the linear body measurements of the domestic rabbit are not reported in literature to best of our knowledge.

Moreso in Nigeria, literatures reporting findings on the effect of weaning age on performance characteristics of rabbits are highly scant. Such information is therefore necessary as variations exist in the performance of various breeds of animals (Chineke, *et al*., 2002). Again, most Nigerian farmers adopt indiscriminate weaning ages for livestock species including the domestic rabbit. This practice influences production output adversely. It is then pertinent to evaluate such a factor in order to ascertain the optimum weaning age at which efficient production performance could be achieved. This would find useful application in selection programmes for optimum genetic performance.

The study was therefore design to examine the effect of different weaning ages on the linear body traits of rabbit genotype.

Materials and methods

The study was done at the Rabbitry unit of the Teaching and Research farm, Michael Okpara University of Agriculture, Umudike. The site is geographically located at latitude 5̊ 29′, longitude 7̊ 33′ and altitude of 122 m above sea level. It lies within the tropical rain-forest zone of Nigeria, with minimum and maximum temperatures of 22° and 33°C, respectively. The area is characterized by long duration of rainfall and short periods of dry season. Annual rainfall is below is below 2100 – 2500 mm while relative humidity is 85 %, although values are liable to variations.

Experimental animals and management procedure

A total of 16 breeding rabbits comprising of 12 does and 4 bucks were used to generate progeny for this study. Four genotypes were considered: New Zealand White (NZW), Chinchilla (CHN), NZW x CHN and the reciprocal (CHN x NZW). Does were flushed for 2 weeks before mating. Mating was done in the morning hours by introducing the females into the buck's pen. Mating ratio was 1 buck: 3 does. Abdominal palpation was done 14 days *post coitus*. Pregnant does were moved to separate hutches while non-pregnant ones were left with the bucks until pregnancy occurred. A total of 80 kits survived and were used for the study (Table 1). All routine management operations and medications were duly observed. Fresh clean water and feed were given *ad libitum* all through the experimental period. The feed composed of a concentrate ration of 18 % CP and 2700 Kcal/kgME supplemented with *Panicum maximum* and *Centrosema pubescens*. The animals were reared in individual hutches in row cages made of metal and wire guaze.

Experimental Treatment and Data Collection

Four weaning ages were adopted as follows:
W28 = weaning at 28 days of age (4 weeks)
W42 = weaning at 42 days of age (6 weeks)
W56 = weaning at 56 days of age (8 weeks)

After weaning, data were generated weekly on each genotype on the following body parameters – body length, heart girth, head-to-shoulder, shoulder-to-tail, length of hind limb and tail drop length. The measurements lasted for 8 weeks from weaning.

Experimental Design and Statistical Analysis

The experimental was a completely randomized design (CRD) with age at weaning as factor of interest. The statistical model used is as follows:

$Y_{ij} = \mu + A_i + E_{ij}$

Where,

Y_{ij} = parameter of interest
μ = overall mean
A_i = mean effect of the ith age at weaning (i = 1 – 3)
E_{ij} = random error [iind(0, δ^2)]

All data collected were subjected to analysis of variance (ANOVA) using SPSS (1999) analytical package. Significant means were separated with Duncan's New Multiple Range Test (Duncan, 1955).

Results and Discussion

For ease of presentation, only results of initial and final weeks of measurement were presented for all the traits studied. Means of the various linear body parameters of the 4 genotypes(NZW x NZW, CHN x CHN, NZW x CHN and CHN x NZW) at the different weaning ages are as shown in Tables 2 (initial) and 3 (final), respectively. The analysis of variance (ANOVA) showed significant ($P < 0.05$) effects of weaning age on the linear body traits of the different rabbit genotypes studied. At both the initial and final stages of growth, kits of all the genotypes weaned at W28 had significantly longer body length, head-to-shoulder, shoulder-to-tail, length of hind limb, tail drop and broader heart girth compared to kits weaned at both W42 and W56. Generally, kits weaned at W42 had significantly ($P < 0.05$) better linear body traits than those weaned at W56. However, at the initial stage, kits of W42 had significantly ($P < 0.05$) longer shoulder-to-tail than those of W28 and W56. Length of hind limb for CHN x CHN, NZW x CHN and CHN x NZW kits at W42 compared favourably with length of hind limb of their counterparts at W56. From Table 3, shoulder-to-tail of kits for all the genotypes, body length for NZW x CHN and length of hind limb for NZW x CHN and CHN x NZW at W42 were statistically similar with those of kits at W56.

The higher post-weaning linear body performance of the W28 kits followed by the W42 kits could possibly be attributed to a higher feed consumption rate when compared to the kits weaned later. Gallois *et al*. (2003, 2004) demonstrated that feed consumption was significantly higher for early weaned rabbits in comparison to those weaned at 35 days of age. Fonteh *et al.* (2005) observed that early weaned kits overcame weaning stress and also developed the capacity to handle efficiently solid and fibrous feed than the late weaned kits. In corroboration, Xicatto *et al.* (2000) and Tumova *et al*. (2006) stated that digestive tract development does not affect feed consumption of early weaned rabbits. Although Fortun-Lamothe *et al.* (2002) had showed that early weaning provided higher viability and fastest growth in weaned rabbits. The results obtained this study are in conformity with earlier reports on growth performance of rabbits based on weaning ages. Marongiu *et al*. (2006) assessed the growth and carcass characteristics of rabbits weaned at W28 and W63, respectively and reported that kits of W28 were better in all the parameters measured. They reported significant mean live weight (83 days) and daily weight gain (64 – 83 days) values for both experimental groups as 2167 vs 1837 g and 38.4 vs 18.0 g, respectively. Also, the main commercial characteristics of carcasses at slaughter were recorded to be better for kits of W28 than those of W63 in their work. Their result corresponded with reports of earlier authors for kits weaned at the same age (Pargini Bini *et al*., 1992a; Bernardini *et al*., 1994). Marongiu *et al*. (2006) also observed that the dressing out percentage (59.71 vs 51.71 %) which is a very important economic trait in market rabbits was significantly ($P < 0.05$) better for the W28 kits compared to W63 kits. In a similar work but with grasscutters, Henry *et al*. (2012) reported that juvenile grasscutters (pups) weaned at 6 weeks (WA_6), which had longer suckling period did not show better post-weaning performance than those weaned at 4 weeks (WA_4) and 2 weeks (WA_2), respectively.

On the contrary, some of the traits measured such as shoulder-to-tail and tail drop did not differ significantly at the final stage between W28 and W42 and W42 and W56, respectively. This is in agreement with the report of Zita *et al*. (2007) who obtained no significant effect of age at weaning and nutrient digestibility on the performance of broiler rabbits. Xicatto *et al*. (2000) did not also observe any significant influence of weaning age on the growth of rabbits.

Conclusions and Recommendations

The result of this study indicated that kits weaned at 28 days of age had longer body length, head-to-shoulder, shoulder-to-tail, tail drop and broader heart girth as compared to those weaned at 42 and 56 days of age, respectively. It therefore suggests that late weaning apart from being inconveniencing to the farm economy, will affect rabbit production adversely and thus should be avoided. Weaning of kids at 28 day of age could lower the intensive management of the rabbits through shorter rearing period thereby improving animal welfare which is of paramount interest to several consumers of nowadays.

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Tables

Table 1: Mating scheme and number of offspring produced

Mating type (Genotype)	Number of does	Number of bucks	Number of offspring
NZW x NZW	3	1	20
CHN x CHN	3	1	20
NZW x CHN	3	1	20
CHN x NZW	3	1	20
Total	12	4	80

NZW = New Zealand White, CHN = Chinchilla

Table 2: Effect of different weaning ages on linear body traits of the different genotypes (Initial week)

		Linear body traits					
Weaning age	Genotype	BL	HG	HTS	STT	LHL	TD
W28	NZW x NZW	43.22 ± 1.11^a	12.82 ± 0.31^a	10.84 ± 0.35^a	17.85 ± 0.11^a	14.24 ± 0.21^a	6.82 ± 0.94^a
	CHN x CHN	43.37 ± 1.10^a	13.36 ± 0.25^a	11.05 ± 0.19^a	17.90 ± 0.13^a	14.53 ± 0.39^a	7.34 ± 0.12^a
	NZW x CHN	41.96 ± 0.19^a	13.42 ± 0.16^a	11.77 ± 0.23^a	17.10 ± 0.31^a	13.76 ± 0.35^a	7.20 ± 0.12^a
	CHN x NZW	42.62 ± 0.94^a	13.56 ± 0.18^a	11.92 ± 0.13^a	17.56 ± 0.14^a	13.90 ± 0.15^a	7.18 ± 0.31^a
W42	NZW x NZW	33.58 ± 0.15^b	11.45 ± 0.11^b	7.88 ± 0.22^b	16.64 ± 0.37^a	13.25 ± 0.31^b	5.80 ± 0.70^b
	CHN x CHN	34.13 ± 0.14^b	12.15 ± 0.78^b	7.90 ± 0.14^b	$15.\ 09 \pm 0.20^b$	13.98 ± 0.09^a	6.78 ± 0.94^a
	NZW x CHN	33.52 ± 0.13^b	11.74 ± 0.13^b	7.77 ± 0.16^b	16.43 ± 0.39^b	13.40 ± 0.17^b	6.29 ± 0.19^b
	CHN x NZW	33.90 ± 0.17^b	11.91 ± 0.12^b	7.74 ± 0.19^b	16.88 ± 0.25^a	13.79 ± 0.17^a	6.56 ± 0.15^a
W56	NZW x NZW	24.13 ± 0.17^c	10.20 ± 0.70^c	5.83 ± 0.15^c	13.98 ± 0.94^c	11.23 ± 0.48^c	5.20 ± 0.12^c
	CHN x CHN	25.84 ± 0.80^c	10.30 ± 0.19^c	6.38 ± 0.13^c	14.28 ± 0.24^c	12.26 ± 0.10^b	5.30 ± 0.16^c
	NZW x CHN	24.63 ± 0.17^c	10.30 ± 0.13^c	5.85 ± 0.13^c	13.63 ± 0.29^c	10.95 ± 0.06^c	5.45 ± 0.13^c
	CHN x NZW	25.03 ± 0.34^c	10.50 ± 0.08^c	6.05 ± 0.13^c	14.15 ± 0.12^c	11.75 ± 0.21^c	5.33 ± 0.09^c

[a-c] Means with different superscripts within the same column are significantly different ($P < 0.05$). NZW = New Zealand White, CHN = Chinchilla, BL = body length, HG = heart girth, HTS = head-to-shoulder, STT = shoulder-to-tail, LHL = length of hind limb, TD = tail drop.

Table 3: Effect of different weaning ages on linear body traits of the different genotypes (Final week)

		Linear body traits					
Weaning age	Genotype	BL	HG	HTS	STT	LHL	TD
W28	NZW x NZW	65.70 ± 0.99^a	15.40 ± 0.16^a	12.98 ± 0.27^a	20.00 ± 0.30^a	15.70 ± 0.21^a	8.25 ± 0.85^a
	CHN x CHN	67.08 ± 0.55^a	15.70 ± 0.16^a	12.98 ± 0.27^a	20.00 ± 0.30^a	17.18 ± 0.27^a	8.28 ± 0.23^a
	NZW x CHN	64.48 ± 0.78^a	15.30 ± 0.07^a	13.52 ± 0.07^a	20.32 ± 0.32^a	15.38 ± 0.21^b	8.06 ± 0.22^a
	CHN x NZW	65.37 ± 0.85^a	15.52 ± 0.07^a	13.86 ± 0.13^a	20.78 ± 0.20^a	15.38 ± 0.21^b	8.22 ± 0.04^a
W42	NZW x NZW	46.38 ± 1.35^b	14.73 ± 0.09^b	10.20 ± 2.30^b	20.62 ± 0.41^a	15.03 ± 0.36^b	8.06 ± 0.22^a
	CHN x CHN	54.13 ± 1.83^b	15.38 ± 0.19^a	11.76 ± 0.09^b	20.90 ± 0.14^a	15.18 ± 0.32^b	7.75 ± 0.65^a
	NZW x CHN	43.93 ± 0.90^b	13.91 ± 0.06^b	10.95 ± 0.22^b	20.31 ± 0.07^a	14.98 ± 0.14^b	7.73 ± 0.09^a
	CHN x NZW	42.68 ± 0.32^b	14.58 ± 0.09^b	11.68 ± 0.33^b	20.55 ± 0.16^a	14.93 ± 0.19^b	7.66 ± 0.13^a
W56	NZW x NZW	37.04 ± 0.08^c	13.23 ± 0.11^c	9.44 ± 0.15^c	18.00 ± 0.34^b	14.70 ± 0.22^b	7.04 ± 0.17^b
	CHN x CHN	37.16 ± 0.22^c	13.36 ± 0.08^c	9.52 ± 0.09^c	19.78 ± 0.45^b	14.94 ± 0.15^b	8.06 ± 0.22^a
	NZW x CHN	36.00 ± 0.09^c	13.22 ± 0.05^c	9.13 ± 0.17^c	17.48 ± 0.01^b	14.93 ± 0.19^b	7.02 ± 0.17^b
	CHN x NZW	36.39 ± 0.15^c	13.44 ± 0.08^c	9.34 ± 0.09^c	17.88 ± 0.22^b	14.42 ± 0.23^b	7.00 ± 0.08^b

[a-c] Means with different superscripts within the same column are significantly different ($P < 0.05$). NZW = New Zealand White, CHN = Chinchilla, BL = body length, HG = heart girth, HTS = head-to-shoulder, STT = shoulder-to-tail, LHL = length of hind limb, TD = tail drop.