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ORIGINAL ARTICLE

EFFECT OF BREED TYPE ON BODY LINEAR PARAMETERS OF RABBITS

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Abstract

The study was conducted to determine the effects of breed type on body linear parameters in rabbit. Thirty-six rabbits, 12 per breed were randomly assigned to three treatments (breeds). The rabbits were housed in wooden hutches inside a well-ventilated pen. They were caged individually based on breed type and were provided with commercial feed while clean drinking water was provided *ad libitum*. The rabbits were allowed to acclimatize for 3 weeks before the commencement of measurements of body linear parameters. Data were collected on neck length, body length, body width, ear length, tail length and heart girth. Data collected were analyzed using one-way analysis of variance of the SPSS version 21. The results revealed that breed had significant effect ($P<0.05$) on neck and ear length of the rabbits. New Zealand White showed higher neck length (6.67±0.60 g) compared to Chinchilla (5.42±0.20 g) and Dutch breed (5.17±0.2 g). On the other hand, Dutch (11.33±0.18g) and Chinchilla (11.82±0.22 g) exhibited higher ear length than New Zealand (10.50±0.34 g) breed. However, no significant ($P>0.05$) effect of breed on body length, body width, tail length and heart girth. It was concluded that Dutch breed which had longer ear length and Chinchilla breed which had higher heart girth may be used for commercial rabbit production because ear length and heart girth can affect thermoregulation and cardiovascular health of the rabbits. Dutch and Chinchilla breed could have more ability to withstand tropical environment than New Zealand White.

Keywords: Cardiovascular health, morphometric, NSUK, rabbit breeds, thermoregulation.

Introduction

Rabbits are an important source of protein and play a significant role in the livestock industry. With the increasing demand for rabbit meat, there is a need to improve rabbit production and productivity. Breed is a critical factor that affects the performance and productivity of rabbits. Understanding the effect of breed on body linear parameters is essential for selecting suitable breeds for specific production purposes (Suleiman *et al.*, 2017). The relationship existing among linear body measurement traits, provide useful information on performance, productivity and carcass characteristics of rabbit.

Besides, body weight and linear parameter of meat animals have been found useful in quantifying body size and shapes (Ilori *et al.*, 2012). Abdullah *et al.* (2020) reported that shoulder to tail length is the best predictor of body weight in rabbits, followed by body length and heart girth. Information on the inter-relationship among linear body measurement of rabbit in the humid tropics is scanty in available literature. Therefore, the objective of this study was to determine the effect of breed type on body linear parameters of rabbits.

Materials and Methods

The experiment was conducted at the Livestock Teaching and Research Farm, Animal Science Department, Faculty of Agriculture Shabu-Lafia Campus. The design of the experiment was completely randomized design. A total of 36 weaned rabbits (6 weeks old), 12 from each breed (New Zealand white, Chinchilla, and Dutch) were randomly allocated to hutches according to breed type. Each breed type served as the treatment and the 12 rabbits were subdivided into three sub-groups (replicates) with 4 rabbits per replicate. To be sure of the breed purity, the rabbits were purposively purchased from National Veterinary Research Institute (NVRI) Vom, Plateau State of Nigeria.

Wooden hutches were used to house the rabbit inside a well-ventilated building. Before the arrival of the rabbits, the hutches were thoroughly washed, disinfected and allowed to dry for days. On arrival, the rabbits were administered anti stress (vitylate) through drinking water. The rabbits were caged based on breed type in clearly marked hutches and were provided with weighed amount of commercial feed while clean drinking water was provided *ad libitum.* The rabbits were allowed to acclimatize in the rabbitry unit for 3 weeks before the commencement of measurements of parameters which was taken every week for 6 weeks.

Data Collection

Body linear parameters were measured using a measuring tape and recorded in centimeters. The parameters measured were: Body length (BL), Heart girth (HG), Leg length (LL), Ear Length (EL), Neck Length (NL) and Body Width (BW) based on the report of Abdullahi *et al.* (2020)

Data Analysis

All the data collected were analyzed using one way analysis of variance of the SPSS statistical software version 21, was used to test the effect of breed type on the parameters monitored. Where significant differences existed, means were separated using Duncan's Multiple Range Test at a probability level of 0.05.

Results

Table 1 presents the effects of breed type on body and neck length of rabbits. Breed had no significant ($P>0.05$) effect on body and neck length of rabbits. Values of body length ranged from 29.50±0.99 to 33.83±0.47 cm.

The effect of breed type on body width of rabbits is presented in Table 2. Breed had no significant ($P>0.05$) effect on body width of rabbits through the study. Body width range from 20.50±1.12 to 39.26±15.9 cm.
The effect of breed type on heart girt of rabbits are presented in Table 3. Breed did not significantly ($P>0.05$) affect the heart girt of rabbits except at week 2. Chinchilla and Dutch breed exhibited higher heart girth ((21.47±0.54 and 21.58±0.75 cm respectively) compared to New Zealand white (17.65±0.48 cm).

Table 4 presents the effect of breed type on leg length of the rabbits. Breed had no significant ($P>0.05$) effect on leg length of rabbits except at week 3. Dutch exhibit higher leg length (22.67±0.83 cm) compared to Chinchilla (20.00±0.37 cm) and New Zealand (18.91±0.45 cm) breed of rabbits.

Table 1: Effect of Breed type on Body Length (cm) of Rabbit

Age	T_1	T_2	T_3	P-Value
Week 1	29.50±0.99	30.42±0.71	30.18±3.07	0.661
Week 2	30.73±0.98	32.50±0.87	32.83±0.98	0.272
Week 3	29.67±1.56	33.83±0.47	31.41±1.09	0.061
Week 4	31.08±0.80	31.00±0.29	30.83±1.37	0.982
Week 5	31.33±0.77	31.67±0.33	31.50±1.67	0.975
Week 6	31.50±0.76	31.83±0.31	31.17±1.19	0.855

T_1= New Zealand Breed, T_2= Chinchilla Breed, T_3= Dutch Breed

Table 2: Effect of Breed type on Body Width (cm) of Rabbit

Age	T_1	T_2	T_3	P-Value
Week 1	20.50±1.12	21.17±0.70	39.26±15.9	0.295
Week 2	23.68±1.32	19.67±1.61	22.18±0.78	0.116
Week 3	21.91±1.14	24.17 ±0.40	22.83±0.70	0.176
Week 4	21.67±0.61	22.67±0.33	22.16±0.54	0.406
Week 5	23.00±0.56	22.00±0.93	21.75±0.92	0.535
Week 6	22.50±0.92	22.42±0.27	22.16±1.19	0.959

T_1= New Zealand Breed, T_2= Chinchilla Breed, T_3= Dutch Breed

Table 3: Effect of Breed type on Heart Girth (cm) of Rabbit

Age	T_1	T_2	T_3	P- value
Week1	21.00±0.52	22.06±1.47	21.50 ±0.73	0.753
Week2	$17.65±0.48^b$	$21.47±0.54^a$	$21.58±0.75^a$	0.000
Week3	20.92±0.68	21.58±0.95	20.25±1.09	0.604
Week4	51.00±30.8	21.16±1.12	19.76±1.11	0.397
Week5	19.67±0.38	20.67±0.51	20.67±0.67	0.342
Week6	20.08±0.23	21.25±0.52	21.58±1.04	0.300

T_1= New Zealand Breed, T_2= Chinchilla Breed, T_3= Dutch Breed, ^{ab}=Value within the same row with same superscripts are not significantly different at 5 percent level of significant.

Table 4: Effect of Breed type on Leg Length (cm) of Rabbit

Age	T_1	T_2	T_3	P- value
Week1	18.33±1.15	20.41±0.98	17.58±2.51	0.489
Week2	20.25±0.74	20.00±0.46	20.67±0.57	0.737
Week3	18.91±0.45^{b}	20.00±0.37^{b}	22.67±0.83^{a}	0.001
Week4	23.50±0.22	22.17±2.12	21.42±4.23	0.863
Week5	24.58±0.58	25.75±2.34	24.00±0.51	0.684
Week6	24.16±0.70	23.00±0.76	23.91±1.13	0.627

T_1= New Zealand Breed, T_2= Chinchilla Breed, T_3= Dutch Breed,^{ab}=Value within the same row with same superscripts are not significantly different at 5 percent level of significant

Table 5 presents the effect of breed type on neck length of rabbits. Breed had no significant (P>0.05) effects on neck length of rabbits except at week 3 where New Zealand white has higher neck length (6.67±0.60 cm) compared to Chinchilla (5.42±0.20 cm) and Dutch (5.17±0.2 cm) breed of rabbits.
Effect of breed type on tail length is presented in table 6. Breed had no significant (P>0.05) effects on tail length of rabbits. Values for tail length ranged from 7.33±0.21 to 14.25±3.42 cm.
Table 7 presents the effect of breed type on ear length of rabbits. Breed type had no significant effect (P>0.05) on ear length of rabbit except at week 1 where Chinchilla (11.33±0.18 cm) and Dutch (11.82±0.22 cm) had significantly (P<0.05) higher ear length compared to New Zealand white (10.50±0.34 cm) breed of rabbits.

Table 5: Effect of Breed Neck Length (cm) of Rabbit

Age	T_1	T_2	T_3	P- value
Week1	4.50±0.34	4.75±0.48	4.17±0.16	0.518
Week2	6.08±0.20	5.50±0.32	5.67±0.24	0.290
Week3	6.67±0.60 ^{a}	5.42±0.20 ^{b}	5.17±0.2 ^{b}	0.032
Week4	5.67±0.17	5.17±0.38	5.41±0.53	0.664
Week5	6.17±0.31	6.66±0.80	6.33±10.74	0.448
Week6	5.50±0.22	5.17±0.47	5.83±0.47	0.532

T_1= New Zealand Breed, T_2= Chinchilla Breed, T_3= Dutch Breed, ^{ab}=Value within the same row with same superscripts are not significantly different at 5 percent level of significant

Table 6: Effect of Breed on Tail Length (cm) Of Rabbit

Age	T_1	T_2	T_3	P- value
Week1	7.33±0.21	7.50±0.34	7.45±0.43	0.939
Week2	6.87±0.18	7.83±0.49	9.67±1.57	0.145
Week3	7.33 ±0.16	7.58±0.52	6.91±0.33	0.454
Week4	8.17±0.44	12.75±5.15	14.25±3.42	0.475
Week5	8.08±0.15	8.41±0.32	7.83±0.73	0.690
Week6	8.00±0.50	8.00±0.28	7.58±0.59	0.781

Table 7: Effect of Breed on Ear Length Of Rabbit

Age	T_1	T_2	T_3	P-value
Week1	$10.50±0.34^{b}$	$11.33±0.18^{a}$	$11.82±0.22^{a}$	0.009
Week2	11.15±0.23	11.25±0.11	11.72±0.21	0.085
Week3	10.85±0.95	11.67±0.54	10.58±0.62	0.282
Week4	10.92±0.33	11.50±0.45	11.08±0.43	0.591
Week5	11.33±0.42	11.92±0.43	10.92±0.20	0.191
Week6	11.16±0.21	11.67±0.36	11.16±0.67	0.674

T_1= New Zealand Breed, T_2= Chinchilla Breed, T_3= Dutch Breed,^{ab}=Value within the same row with same superscripts are not significantly different at 5 percent level of significant

Discussion

The non significant effect of breed type on body length as observed throughout the study, strongly agreed with the report of Fontanesi (2021), who noted that body length variations among rabbit breeds may not be significant under controlled management conditions. Value obtained in this study for body length was within the range of 20 to 35cm reported by Fontanesi (2021)

Body widths were not significantly affected by breed. The values obtained in this study are within a range of 19 to 25cm reported by DalleZotte and Szendro (2011) who observed minimal breed differences in body width in a controlled environment. However, this study contradicts Suleiman *et al.* (2017) who observed significant breed effects on body width under varying environmental and management conditions

Significant difference was observed in heart girth as affected by breed. The values obtained from this study for heart girth of rabbits were within a range of 16 to 22cm reported by Koziol *et al*. (2017), who noted that certain rabbit breeds may develop differently in terms of chest girth, potentially affecting respiration and endurance.

Breed had significant ($P<0.05$) effect on Leg length at week 3. Dutch breed had significantly ($P<0.05$) longer legs compared to New Zealand and Chinchilla. The values obtained for leg length for rabbits in this study strongly disagreed with the range of 10 to 12cm reported by Palka *et al.* (2017) and Marai (2002) observed that longer legs in certain breeds were linked to better environmental adaptability, especially in open warmer climates.

A significant difference was noted in neck length in week 3, with New Zealand rabbits showing longer necks compared to Dutch rabbits. The values obtained were within the range of 5 to 8 cm as noted by Feki and Labussiere (1998), who indicated that neck length variation is likely due to skeletal genetic traits inherent to specific breeds. They observed that meat-focused breeds often exhibited longer necks, potentially linked to greater skeletal development in regions that support muscle attachment.

Breed had no significant ($P>0.05$) effect on tail length, suggesting uniformity across breeds in this measurement. The values obtained from this study for tail length, disagreed with the range of 5 to 8cm reported by Feki and Labussiere (1998).

Significant difference in ear length was observed at week 1, with Chinchilla and Dutch breeds displaying longer ears compared to New Zealand White. The values obtained for ear length in this study agreed with the range of 8 to 12 cm reported by Gugolek *et al*. (2019). It was noted that ear length in rabbits can vary significantly between breeds, often due to adaptation needs for heat regulation. Longer ears, as observed in Chinchillas and Dutch rabbits, may provide an advantage in dissipating heat more effectively in warmer environments.

Conclusion

In this study, it was found that breed had effect on heart girth at week 2 as well as on leg, neck and ear lengths. Chinchilla and Dutch breed had higher heart girth compared to New Zealand White breed. Dutch breed had longer legs compared to New Zealand and Chinchilla at week 3. New Zealand breed had longer necks compared to Dutch and Chinchilla breed at week 3. Chinchilla and Dutch breeds displayed longer ears compared to New Zealand White at week 1. However, there was no significant effect of breed on body length, body width and tail length. Based on this study, it could be concluded that, Dutch breed which had longer ear length and Chinchilla breed which had higher heart girth may be used for commercial rabbit production because ear length and heart girth can affect thermoregulation and cardiovascular health of the rabbits. Dutch and Chinchilla breed could have more ability to withstand tropical environment than New Zealand White.

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