VARIATION IN LITTER SIZE AND ITS ASSOCIATION WITH PRE-WEANING WEIGHTS OF MONGREL RABBIT KITS REARED IN GUINEA SAVANNAH REGION OF NIGERIA

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ABSTRACT
This work was aimed at investigating the effect of litter size on growth performance of mongrel rabbits reared in the Guinea savannah geo-ecological region of Nigeria. Thirteen mongrel rabbits does and four bucks were used as parents to generate the kits. The research was conducted at the Livestock Teaching and Research farm, Joseph Sarwuan Tarka University, Makurdi, Benue State. Data were collected on birth weights and weekly body weights changes of rabbit kits using sensitive weighing balance. Data were subjected to one-way analysis of variance as implemented in SPSS. Significant disparity (P>0.001) was recorded in birth weight of kits with litter size 5 having higher birth weight than litter sizes 6, 7 and 8. Litter size 6, 7 and 8 had comparable birth weight (P<0.05). Rabbit kits in litter size 5 had significantly (P<0.05) higher body weight at week 1 than those in litter sizes 6, 7 and 8. Rabbit kits in litter size 5 also had significantly (P<0.001) the highest body weight at weeks 2, while kits in litter sizes 6, 7 and 8 had comparable body weight at week 2. Body weights at week 3 were comparable among kits in litter sizes 6, 7 and 8, but lower than that of kits in litter size 5. This trend continued up to week 5 of age. Significantly (P<0.05) positive and moderate correlations were recorded between birth weight and body weights at week 1 to 5. In conclusion, the higher the litter size, the lower the birth weight and pre-weaning weight of mongrel rabbits.
Keywords: Mongrel rabbits, litter, birth weight, correlation, preweaning

INTRODUCTION

Rabbit production is an important component of global livestock farming, contributing to food security and livelihoods in many regions. Rabbits are a versatile animal species that have been used for various purposes such as meat production, fur production, pets, laboratory animals, and biomedical research (Yakubets and Bochkov, 2018). They have a long history of domestication and taxonomy, and their breeding and production have faced challenges that require improvement. In terms of meat production, the live weight of rabbits is an important factor that determines their meat yield, and there is a correlation between body measurements and live weight (Miller *et al*., 2014).

The consideration of litter size serves as a primary trait for selection in breeding programs focused on maternal lines (Cartuche *et al*., 2014). It is important to acknowledge that the inclusion of this trait in the selection process has proven to be fruitful, resulting in a notable augmentation in the quantity of rabbits born alive per litter (García and Argente, 2020). Kits belonging to large litter sizes tend to have lower body weights at birth and during the preweaning period compared to kits from smaller litters (Belabbas *et al*., 2023; Olateju and Chineke, 2022). Does with small litter sizes consistently had higher body weights across the weeks considered (Olateju and Chineke, 2022). The enhanced prolificacy in does has resulted in an increase in within litter variation and a larger number of kits born light, which can impact the overall preweaning weight of the litter (Ajayi et al., 2018). Crossbreeding has been suggested as a way to improve litter size and subsequently preweaning weight in commercial rabbit meat production (Iraqi et al., 2006). Overall, litter size plays a crucial role in determining the preweaning weight of rabbits, with smaller litter sizes generally associated with higher body weights at birth and during the preweaning period. We hypothesized that birth weight and preweaning weights of kits from mongrel rabbits could be better than those of pure breeds. This work therefore was conducted to investigate the effects of litter size on birth weight and preweaning weight of mongrel rabbits.

MATERIALS AND METHODS

Experimental Site

The research was conducted at the Rabbit Unit of the Livestock Teaching and Research farm, Joseph Sarwuan Tarka University, Makurdi, Benue State. Makurdi is located at Latitude7°44'N and longitude 8°21'E), It lies within the middle Guinea Savannah region of Nigeria. The area is warm with a temperature range of 29.8 – 35.6 °C. Rainfall is between 508 – 1016 mm and relative humidity is 44% - 86% (TAC, 2015).

Experimental Animals and Management

Thirteen mongrel rabbits does and four bucks were used as parents to generate the kits. The rabbits were kept individually in hutches made of iron netting (mesh wire) by the side and wooden layout beneath. The rabbits were fed commercial grower pellets containing nutritional facts of oil 6%(max), protein 16%(min), fibre10%(max), ash 10%(max), M.E 2650KCal/Kg and forage (*Tridax procumbens*) and water was given *ad libitum.*

Data Collection and Analysis

Data were collected on birth weights and weekly body weights of rabbit kits using sensitive weighing balance. Data were subjected to one-way analysis of variance as implemented in SPSS. The statistical model used for analysis is as follows:

$$Y_{ij} = \mu + T_i + \varepsilon_{ij}$$

Where:

Y_{ij} = jth measurement on the ith kitten

μ = Population mean,

T_i = effect of the ith litter size (i= 5, 6, 7, 8),

ε_{ij} = Random error.

RESULTS AND DISCUSSION

The effect of litter size on birth weight and pre-weaning weight of mongrel rabbits is presented in Table 1. The results showed significant disparity ($p>0.001$) in birth weight of kits with litter size five having higher birth weight than litter sizes six, seven and eight. Litter size six, seven and eight had comparable birth weight ($p<0.05$). Rabbit kits in litter size five had significantly ($p<0.05$) higher body weight at week one than those in litter sizes six, seven and eight. Rabbit kits in litter size five also had significantly ($p<0.001$) the highest body weight at weeks two, while kits in litter sizes six, seven and eight had comparable body weight at week two. Body weights at week three were comparable among kits in litter sizes six, seven and eight, but lower than that of kits in litter size five. This trend continued up to week five of age.

Table 1 Effect of litter size on birth weight and pre-weaning weight of rabbit kits

	Litter Size						
Age	**5**	**6**	**7**	**8**	**SEM**	**P-value**	**LS**
BW (g)	69.60^{a}	40.33^{b}	43.00^{b}	48.88^{b}	2.014	0.000	***
BWW1	145.40^{a}	83.75^{b}	96.29^{b}	87.25^{b}	6.201	0.010	*
BWW2	285.20^{a}	128.25^{c}	101.43^{c}	125.86^{c}	13.323	0.000	***
BWW3	379.80^{a}	157.83^{b}	155.00^{b}	173.88^{b}	19.029	0.000	***
BWW4	489.60^{a}	291.67^{bc}	237.00^{c}	293.38^{bc}	28.158	0.037	*
BWW5	677.40^{a}	398.42^{b}	315.00^{b}	397.50^{b}	37.242	0.022	**

SEM= Standard Error of Mean, **LS**= Level of Significance, **BW**= Birth Weight, **BWW1**=Body Weight at Week 1, **BWW2**=Body Weight at Week 2, **BWW3**= Body Weight at Week 3, **BWW4**= Body Weight at Week 4, **BWW5**= Body Weight at Week 5.

The result of the correlation between birth weight and weekly body weight of mongrel rabbits is presented in Table 2. The result showed that the correlation between birth weight and body weight at week one, week two and week three were moderately positive and significant ($p<0.05$). However, correlation between birth weight and body weight at week four and week five were lowly positive and not significant ($p>0.05$).

Also at week three, the correlation between the birth weight and body weight of kitten was highly positive and significant ($p<0.01$). This implies that the higher the birth weight of rabbit kitten the higher the body weight will be at week three.

Table 2: Correlation among birth weight and weekly body weight of mongrel rabbits

	BW	BWW1	BWW2	BWW3	BWW4	BWW5
BW	1					
BWW1	0.435*	1				
BWW2	0.435*	0.585*	1			
BWW3	0.470**	0.831**	0.728**	1		
BWW4	0.127	0.432*	0.552**	0.493**	-	
BWW5	0.232	0.535**	0.542**	0.548**	0.872**	1

*=Correlation is significant (P<0.05) **=Correlation is significant (P<0.01)
BW=Birth Weight, **BWW1**=Body weight at week 1, **BWW2**=Body weight at week 2, **BWW3**=Body weight at week 3, **BWW4**=Body weight at week 4, **BWW5**=Body weight at week 5.

This study showed positive correlations between body weight and weekly body weight of rabbit kits. These results agreed with the results obtained by Smith *et al*. (2012) who reported that rabbits with higher birth weights tend to exhibit higher body weights as they continue to grow. In a similar vein Johnson and Brown (2010) reported similar findings in their study, further highlighting the positive association between birth weight and subsequent weekly body weight in Mongrel rabbits.

Conclusion

In conclusion, the higher the litter size, the lower the birth weight and preweaning weight of mongrel rabbits.

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