PRE-WEANING PERFORMANCE OF HETEROGENEOUS STOCK OF RABBITS DURING THE RAINY SEASON IN SOUTHWEST NIGERIA

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ABSTRACT
The population of rabbits in the tropics is highly heterogeneous and the prevailing environmental conditions play significant roles in their survival post kindling; thus, influencing productivity and profitability. This study was carried out to assess the impact of low Temperature-Humidity conditions on the performance of rabbit kits from birth to weaning. Sixty-six heterogeneous adult rabbits (55 primiparous Does and 11 Bucks) were mated for this study and fed concentrate diet throughout this period. Three hundred and twenty-eight kits obtained were managed during a period characterized by cold condition that span through the early (April to May) and late (June to September) rainy season in Nigeria. The temperature and humidity of the pen were taken twice daily. Litter size, weekly weight gain and survival rate were recorded from birth till 4weeks during each phase. The data obtained were analysed using descriptive statistics. The Temperature-Humidity Index during early rainy season (27.4 - 28.9) implies moderate heat stress during this period with absence of stress during late rain (25.2 – 26.6). Higher litter size ($p<0.05$) was recorded during the late rain season compared to that of early rainy season. Weekly weight gain and survival rate ($p<0.05$) of kits increased during early rainy season compared to late rainy season. It can be concluded that low Temperature-Humidity condition during the late rain improved litter size while early rain enhanced weekly weight gain and higher survival rate of rabbit kits.
Keywords: Early rain; Late rain; Litter size; Survival rate; Weight gain

INTRODUCTION

The tropical climate is characterized by high temperature and humidity, this poses several challenges to livestock production due to high prevalence of diseases and parasites, which thrive in warm and humid conditions (Bekele, 2017). The health-related issues associated with high temperature can significantly reduce animal productivity and increase mortality rates. Rabbits (*Oryctolagus cuniculus*) are micro-livestock that are highly prolific with relatively rapid growth but often faced with high impact of heat stress in the tropics (Oladimeji *et al.,* 2022). The growth and survival of the kits is greatly influenced by environmental factors. The period post-kindling is a critical phase for rabbit kits as they are highly sensitive to changes in their environment (Olateju and Chineke, 2022). Heat stress indicated by high Temperature- Humidity index can negatively impact the health and growth of farm animals especially young ones. Temperature-Humidity Index (THI) is a critical metric for assessing the combined effects of temperature and humidity on the comfort and performance of animals in tropical regions (Habeeb, 2020). Exposure to low THI can result in decreased body temperature, leading to reduced metabolic rates, weakened immune systems, and ultimately higher mortality rates (Habibu *et al.,* 2019). When animals are exposed to cooler temperatures and higher humidity, they may experience increased energy expenditure to maintain homestasis (Porter, 2024). Newly born rabbit kits are especially vulnerable to low THI as they lack the fur density and fat reserves necessary to maintain body heat (Mota-Rojas *et al.,* 2021). During the neonatal period, rabbit kits expend more energy to maintain their core body temperature, thus divert resources away from growth and development (Staples *et al.,* 2016). Low temperatures can suppress appetite and reduce feed intake, further exacerbating growth challenges (Nawab *et al.,* 2018). The seasons in the tropics are characterized by varying temperature and humidity which often directly impact rabbit production. The rabbit stock in Nigeria is highly heterogeneous with no distinct record on their performance during the rainy or dry season in a tropical environment like Nigeria. Hence, the need to evaluate the performance of this heterogeneous stock during the rainy and dry conditions. This study was therefore carried out to assess the post-kindling performance of rabbit kits during a period with high rain fall and cold conditions indicated by low Temperature-Humidity Index in Southwest Nigeria.

MATERIALS AND METHODS

The study was carried out during at the Rabbit unit of Teaching and Research Farm, Obafemi Awolowo University, Ile Ife Osun State, Nigeria during the early (March to May) and late (June to September) rainy season. A total of sixty-six heterogeneous adult rabbits (55 primiparous does and 11 bucks) were used to raise the three hundred and twenty-eight kits used for this experiment. The rabbits were housed individually in cages. Concentrate feed containing 17% Crude protein, 10.12% Crude fibre, and 2495Kcal/kg Digestible energy) was served throughout gestation and after kindling till weaning. Feed was supplied to the does daily and clean water provided through automated drinkers ad-libitum. The weight gain, litter size and survival rate were recorded weekly. Weekly weight was taken using a sensitive digital scale and weight gain was calculated as the final body weight minus initial body

weight and recorded in grams. Litter size at birth was estimated as the total number of kits born by each doe. The temperature and humidity of the pen was taken twice daily, morning (8am-9am) and afternoon (12pm-2pm). The Temperature-Humidity Index was calculated using the formular below.

$$THI = t - \left[\left(0.31 - 0.31\left(\frac{RH}{100}\right)\right)(t - 14.4)\right]$$

Where t = indoor temperature of the pen in °C, and RH = relative humidity of the pen in % (Marai et al., 2002).

The Survival Rate was calculated in percentage as the number of kits alive from kindling till weaning using the formular below.

$$Survival\ rate\ (\%) = 100 - \left(\left(\frac{Number\ of\ kits\ at\ birth - Number\ of\ kits\ at\ weaning}{Number\ of\ kits\ at\ birth}\right) X\ 100\right)$$

Data obtained from the study were analyzed using descriptive statistics of System Analytical Software (SAS 2009) while means were separated using Duncan's Multiple Range Test of the same software ($p<0.05$).

RESULTS AND DISCUSSION

The Temperature-Humidity Index during early rain ranged from 27.4 to 28.9 which depicts moderate heat stress while late rain ranged from 25.2 to 26.6 for absence of heat stress (Table 1). This result corroborated the report of Marai *et al*., (2002) who presented <27.8- absence of heat stress; 27.8 to 28.9- moderate heat stress; 29.0 to 30.0 - severe heat stress; > 30.0- very severe heat stress as values of THI obtained for subtropical region. High temperature in the temperate region between 25 and 36 °C during lactation decreased postnatal growth in rabbit kits (Marco-Jimenez *et al*. 2017). At birth, higher litter size was recorded during late rain - 6.2 than early rainy season - 5.0 (Figure 1). This same trend was recorded from week 1 to 4. This result aligns with the report of Fayeye and Ayorinde *(*2008) and Yahaya *et al., (*2022) who also recorded higher litter size during the rainy season. The average weekly weight gain was similar at one week old during both the early and late rainy seasons - 54.5g and 54.4g respectively (Figure 2). From week 2 to 4, weekly weight gain was higher ($p<0.05$) during the early rain than late rain. This corroborates the findings of Sabuwa *et al*., (2024) who reported that kits born during the early rainy season had higher weight gain. Survival rate of rabbit kits decreased weekly (Figure 3). During early rain, a 9.4% decrease was recorded compared to 18.9% during late rain. Asemota *et al., (*2017) also reported the lowest pre-weaning mortality during early rain. Higher pre-weaning mortality during late rain may be due to the impact of cooler temperatures and higher humidity which result in increased energy expenditure thereby disrupting homeostasis (Porter, 2024). The prevalence of microbes during the late rainy season may also contribute to the lower survival rate recorded during the late rainy season.

Table 1: Temperature -Humidity Index (THI) During Early and Late Rainy Season

Parameters	Week 0	Week 1	Week 2	Week 3	Week 4
THI					
Early Rain	27.6	27.6	27.6	28.9	27.4
Late Rain	25.2	26.5	26	26.6	26

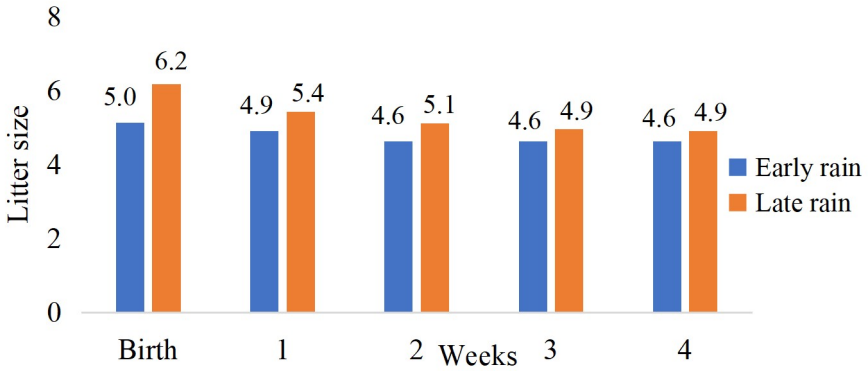

Figure 1: Litter Size of Rabbit Kits during Early and Late rainy season

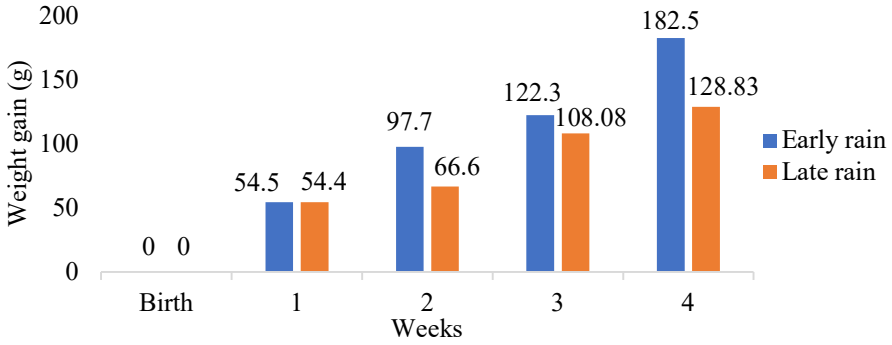

Figure 2: Weight Gain (g) of Rabbit Kits during Early and Late rainy season

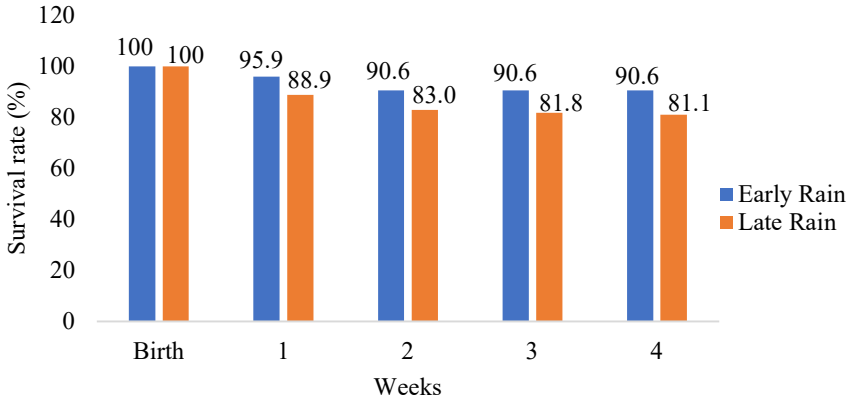

Figure 3: Survival Rate (%) of Rabbit Kits during Early and Late rainy season

CONCLUSION

It can be concluded that low temperature and humidity conditions during the early rainy season creates a more favourable condition for rabbit kits growth and survival. Therefore, for more profitable rabbit breeding in the humid tropics, farmers can harness the benefits of the early rainy period to optimize their performance and survival rates. Further studies should be carried out for more years during the rainy season to fully establish the impact of low temperature and humidity on the heterogeneous stock of rabbit kits on the long run and generate a data base for the rabbit industry.

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