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EFFECT OF AMBIENT TEMPERATURE ON THE REPRODUCTIVE PERFORMANCE OF NEW ZEALAND WHITE RABBITS IN BENIN SOUTHERN NIGERIA

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Target Audience: Researchers and rabbit producers

ABSTRACT

Data on ambient temperature and performance of 37 New Zealand White female rabbits reared at the University of Benin farm project were studied. Data collected span from May 1997 to July 1998. Data were on ambient temperature (ATEMPT), litter size at birth (LITSB), litter size at weaning (LITSW), litter birth weight (LITBW), litter weaning weight (LITWW), gestation length (GLT), morality (MORT) and number of young born alive.

Mean values of 29.230C, 4.89(g) 3.62, 50(g), 280(g), 31.32(days) 3.82 and 23.65(%) were obtained for ATEMPT, LITSB, LITSW, LITBW, LITWW, GLT, NBA and MORT respectively. ATEMPT had negative phenotypic correlation with other traits. R^2 value from the analysis of variance of regression analysis indicated that the recorded ATEMPT could not account for the variance observed in the traits. The results of this study thus suggest that there are other more important factors that influence performance of rabbits at ambient temperature of less 30°C in the tropical rainforest zone of southern Nigeria.

Key words: Ambient temperature, performance, rabbits

DESCRIPTION OF PROBLEM

Rabbit production, whether on a relatively small or commercial scale, could make a substantial contribution to the supply of animal protein for human consumption. However, depressed reproduction and growth have been adduced as the major reason for poorer performance of rabbits in the tropics when compared to the temperate regions (7). Attempts at increasing the productivity of livestock in Nigeria have so far been limited to importing exotic breeds which are either maintained pure or crossed. Regardless of the method, the rabbits have been face with heat stress caused as a result of high ambient temperature. Results from attempts to ascertain the true potential of rabbits, under the prevailing conditions in the tropics have been inconclusive. However, environmental and genetic differences have been associated with differences observed in the reproductive performance of different livestock species with environmental influences playing greater role (3). Consequently,

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the remarkable higher reproduction potentials in terms of young produced per female per year in rabbits could be influenced by environmental conditions such as temperature and humidity, and nutritional status. The tropical environment is noted for this high ambient temperature when compare with the temperate region. Heat stress caused as a result of high ambient temperature has been reported as one of the most important environmental factors which could affect rabbit production (2,5,7).

Rabbits, largely depend on respiratory evaporation for the regulation of its body temperature. This attribute confers on it a limited power of adaption to hot climates. If rabbit production in Nigeria, which is within the tropical zone, is to be given a boost, there will be the need for information on the extent to which ambient temperature can influence its performance. Little information is available on the influence of temperature on the performance of rabbit in humid tropical zone of Nigeria (2,4,9). This present study was therefore undertaken to examine the influence of ambient temperature on the performance of rabbits in the rainforest zone of southern Nigeria. The result of such a study would therefore provide basic information upon which further research could be based.

MATERIALS AND METHODS

The study was carried at the University of Benin farm project which is situated on latitude 6^0 and 6^0 3'N of the equator and longitude 5^0 4' and 6^0E of the Greenwich meridian. The University and environs lie in the rainforest zone with annual rainfall, relative humidity and temperature of 2162mm, 72.5% and 28^0C respectively . The seasonal distribution of rainfall could be grouped into two seasons; rainy season (April-September) and dry season (October-March). The university has an established rabbitry. The rabbits were fed commercial growers feed and forages *ad libitum* to enable animals feed to situation. The does were placed on high plane of nutrition during gestation to have enough nutrient for foetal development. Does were palpated between 12 and 14 days *post coitus* to determine pregnancy. Few days to kindling, clean wooden kindling boxes were made available in the does hutches for the does to prepare the nest for kindling. After kindling, the kindles were examined and dead ones removed from the box. In cases where the doe could not pull enough fur, cotton wool was added. The boxes were removed when kindles have opened their eyes and could move out of the box themselves. Daily management operations which include cleaning of water and feeding troughs, provision of feed and water, cleaning the collecting trays of faeces and removal of faeces from the floor of the house were regularly carried out.

Data Collection and Analyses: Data were collected on 37 New Zealand White Rabbits reared in the University of Benin farm project between May 1997 and July 1998. Daily temperature (ATEMPT) of the rabbit house was taken using a thermometer calibrated in ^{0}C. Birthweight of the (LITBW) was obtained by weighing all the live ones using a weighing scale calibrated in grams and by

dividing by the number of young born alive (NB) were recorded. Mortality from birth to weaning (MORT) was computed. Gestation length (GLT) was obtained by substracting mating date from kindling date. The mean, standard deviation and relationship between temperature performance were determined using the procedures of Laskey (3).

RESULTS AND DISCUSSION

Presenting in Table 1 are the mean, standard deviation, minimum and maximum values obtained for the different performance traits considered. These statics described the strain of Zealand White rabbits reared at the University of Benin farm project. Since the standard deviation were low, it is indicative that the variations observed were typical of the management practise and environmental factors. The variation in temperature ranged between 25.50°C and 31.25°C. Such variation could influence the performance of rabbits since the maximum value was above the 30°C reported as the critical temperature above which reproduction and performance are impaired (2,7). Therefore, considering the changed in the ambient temperature change in the ambient temperature of the rabbit house, impaired of reproduction and performance are not unlikely. However, because the mean ambient temperature (28.23°C) was below the critical temperature of 30°C, the rabbits may not suffer much discomfort and physiological stress.

Table 1 Mean Standard Deviation, Minimum and Maximum value of Ambient Temperature and performance traits of New Zealand White Rabbit in University of Benin farm project.

Variables	Mean	SD	Minimum	Maximum
ATEMPT(°C)	28.23	1.35	25.50	31.25
LITSB	4.89	1.49	2.00	7.00
NBA	3.82	1.40	1.00	7.00
LITSW	3.62	1.60	0.00	7.00
LITBW(g)	50.00	10.00	40.00	60.00
LITWW(g)	280.00	120.00	90.00	560.00
GLT(days)	31.32	0.67	299.00	32.00
MORT(%)	23.65	24.67	0.00	100.00

Attempt-ambient temperature; LITSB- Litter size at birth, LITSW- Litter size at weaning; NBA- Number born alive; LITSW- Litter birth weight; LITWW - Litter weaning weight; GLT- Gestation length; MORT - Mortality.

The slightly lower litter size at birth reported in this study may be described to the effect of temperature and other environmental factors. But the values obtained for litter size and average litter weight at weaning agree with other studies (7,5,6), thus suggesting lack of temperature effect on the kindles. However, there seemed to be high embryonic mortality rates during the study

period as was also observed by Rath (8), who reported that high ambient temperature above 30°C leads to smaller blastocysts and embryos and an increase in embryo mortality rates.

The relatively smaller litter birth weight obtained in this study can be attributed probably to smaller blastocysts and embryos which may have been formed as a result of the high temperature observed. This is corroborated by Somade (9) who reported that in the tropical environment of south western Nigeria, seasons have deleterious effects on reproduction of rabbits, especially in the number of young born alive.

Gestation length obtained in this study fits perfectly well with those in the literature for New Zealand White rabbits and other breeds and therefore could be said to be species specific and not necessarily influenced by temperature or management practices.

The phenotypic correlations between temperature and the traits and among the traits are presented in Table 2. There were more negative that positive correlations. The values were generally low. Ambient temperature tended to have a negative relationship with the traits. However, litter six at birth had a highly and positive significant relationship (P<0.01) with litter weight at weaning.

Table 2: Phenotypic correlation among traits and between Ambient Temperature in New Zealand White Rabbits Reared in University of Benin Farm Project.

Variables	ATEMPT	LITSB	LITBW	LITWW	GLT	MORT
ATEMPT						
LITSB	-.04					
LITSW	.10	.64**				
LITBW	-.12	.27	-.01			
LITWW	-.17	-.53	-.64			
GLT	-.11	.15	.14	.12	-.02	
MORT	-.21	.14	-.58	.31	.33	-.01
NBA	.10	.61	.10	-.03	-.63	.10

* = (P<0.05) ** = (P<0.01)

Mortality was negatively related (P<0.05) to litter birth weight while number born alive was positively related (P<0.05) with litter size at birth and negatively with suggestion length.

CONCLUSIONS AND APPLICATIONS

From the findings of this study it can be concluded that:

i. There are other more important factors that influence phenotype traits when ambient temperature is less than 30°C.
ii. Intensive production of rabbit can be achieved in the southern rainforest zone of Nigeria.

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