Behaviour and Growth Performances of New Zealand White Rabbit Kits Weaned at Three Different Ages under Tropical Climate

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Abstract

Artificial weaning has been identified as one of the critical management practices as it induces psychological, physical and nutritional stresses in kits. Therefore, present study was conducted to investigate the behaviour and leucocyte response (White blood cell (WBC) count and Neutrophil:Lymphocyte (N:L) ratio) to artificial weaning in order to detect the level of stress and to study the growth performances of New Zealand white rabbit kits under tropical climate. Fifteen New Zealand White rabbit does were divided in to three treatment groups (n = 5) corresponding to the different weaning ages and designated as T1= weaning at 21 days; T2= weaning at 35 days and T3 = weaning at 49 days. The experiment was conducted for three consecutive parities of a doe and altogether 15 litters per treatment were studied. Drinking and feeding behaviours were significantly increased in T1 kits while lying was significantly decreased just after weaning ($P<0.05$). Grooming and sitting were significantly ($P<0.05$) increased in T2 kits. Moving, grooming and drinking were increased ($P<0.05$) while lying, feeding and sleeping were decreased ($P<0.05$) in T3 kits after weaning. Crouching and rearing were significantly ($P<0.05$) increased in all three treatments just after weaning. WBC count and N:L ratio were significantly ($P<0.05$) increased inT1 kits while only the N:L ratio was increased ($P<0.05$) in T2 kits just after weaning. Irrespective of parity, the growth rate of the rabbit kits among three treatments, was significantly ($P<0.05$) affected during the weeks 4, 5 and 7 and there was no significant difference in 8th and 9th weeks.

Key words: Rabbit kits, Weaning, Behaviour, Leucocyte, Growth rate

Introduction

Typically, artificial weaning involves abrupt breakdown of the mother- young relationship, sudden change in the diet of kits, experience of novel environment, social change and more intense human intervention. Therefore, all these sudden changes have potential to induce psychological, physical and nutritional stresses in weaned kits. Stress induces reactions in animals including behavioural and physiological modifications aiming at coping towards the stressors (Moberg and Mench, 2000). Out of these, behaviour changes seems to be the most consistent and reliable indicator of acute stress (Hicks *et al.*, 1998). However, literature is lack with weaning age and behaviour development of rabbit kits.

Hematological studies give the opportunity to investigate the presence of several metabolites and other constituents and help to detect conditions of stress, which can be nutritional, environmental or physical. It has been shown that stress associated increase in cortisol can result in an alteration of blood leukocyte concentration, specifically an increase in Neutrophils and a concomitant decrease in Lymphocytes in the peripheral blood that would result in an increase in the Neutrophil:Lymphocyte ratio in the stressed animals.

Many studies have observed negative effect of early weaning (21 or 28 days) on live weight in comparison with rabbits weaned at 32 days of age or more (Gidenne and Fortun-Lamothe, 2004). In contrast, Zita, (2007) reported no significant effect of weaning age on the

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body weight of rabbit kits. However, most research on early weaning of the litters have been carried out under temperate climatic condition and data are scared under tropical climatic condition.

The aim of the present study was to determine the effect of age at weaning on the level of stress and growth performances of rabbit kits under tropical environment.

Materials and Methods

Fifteen rabbit does of breed New Zealand White were used to generate 45 litters in three parities. Breeding females were divided in to three treatment groups (n = 5) corresponding to different weaning ages of kits and designated as T1= weaning at 21 days; T2= weaning at 35 days and T3= weaning at 49 days. Kits from five does were weaned under each weaning age group and the experiment was conducted up to the third parity in each doe. This provided a total of 15 litters under each weaning age group.

The experimental animals were managed in a semi enclosed building (900 cm long x 360 cm wide x 240 cm height) under natural ventilation condition. On average the day and night temperatures were 27°C and 21°C and the relative humidity was 64% at the experimental location. The rabbits were housed in wire cages inside the building. Each doe was provided with an individual cage made of wood and poultry wire mesh (1/2"). The dimensions of each cage was 75cm x 75cm x 50cm of length, width and height. Similar size cages were provided for the weaned kits. Commercially available Broiler Finisher pellet diet, wilted Napier grass *(Pennisetum purpureum)* and water were provided *ad libitum* for all the breeding does and the weaned kits.

Behaviour of the kits was observed three days prior to weaning and three days following weaning (six hours per day) according to the instantaneous scan sampling method at every five minute intervals following an ethogram. On the second day following weaning (48 hours), blood samples were collected from two randomly selected kits per one litter. 1ml of blood was collected from the central ear artery by using sterilized disposable syringe attached to a 29-gauge x 1/2" needle. The collected blood was immediately transferred into EDTA-K3 tubes and was stored at 4°C. Total WBC count was detected by haemocytometer. Neutrophil and Lymphocyte counts were detected by blood smear method. Litter weight was recorded every week starting from the birth till the end of 9th week to calculate the growth rate of the kits.

Data were analysed by General Linear model of SAS (SAS Inst., Inc., 1996). The differences among the means were evaluated with least significant difference (LSD) means separation test using the PDIFF and STDERR options of SAS.

Results and Discussion

The present investigation showed a significant influence of weaning on behaviour of rabbit kits across the three weaning age groups. Feeding and drinking were increased ($P<0.05$) in T1 kits in all three parities and this may be due to lack of milk feeding as the milk was still the main energy source, kits became hungry and thirsty after weaning and began to drink and eat. Lying behaviour was significantly decreased ($P<0.05$) following weaning both in T1 kits and T3 kits. This may be due to the stress caused by separation of kits from their mother doe as this was not observed in T2 kits. Moving, grooming and drinking were also increased ($P<0.05$), while feeding and sleeping were decreased ($P<0.05$) in T3 kits just after weaning. Therefore, it can be suggested that T3 kits were highly affected by weaning. Rearing and crouching were significantly increased in all three treatments immediately following weaning. Rearing is an exploring behaviour

in rabbits. Weaned kits were introduced to a novel cage and this may be the reason to observe significant increment in rearing behaviour in kits. Grooming and sitting were the only significantly ($P<0.05$) increased behaviours in T2 kits and therefore, altogether only few behaviours were affected by the weaning in T2 kits. Therefore, it could be assumed that T2 kits were not much affected by weaning in the present study.

Highest N:L ratio was observed in T1 kits (1.7) and this value was significantly ($P<0.05$) higher than the other two treatments (1.4 and 1.3 for T2 and T3 respectively). However, the lowest ($P<0.05$) WBC count was observed in T1 kits (3628.3 ± 187.1 Cells/mm^3) and the highest value was observed in T3 kits (5841.7 ± 187.1 Cells/mm^3).

digestion of solid feed. Significantly highest growth rate observed in T3 kits in the 7th week and this may be due to beneficial effects of doe milk as they were not weaned at this stage.

Overall, it could be concluded that higher level of stress in terms of behaviour and haematological parameters was found in rabbit kits weaned at 21 and 49 days and growth performances of the kits were not affected by the weaning age under tropical climate.

Table 1. The overall average growth rate (kg/day) of kits irrespective of parity

Age	Treatment				
(Week)	T1	T2	T3	SE	P Value
1	0.010	0.011	0.011	0.001	0.19
2	0.012	0.010	0.012	0.001	0.58
3	0.009	0.010	0.014	0.001	0.12
4	0.012^{b}	0.019^{a}	0.016^{a}	0.002	0.01
5	0.018^{b}	0.027^{a}	0.024^{a}	0.002	0.01
6	0.023	0.023	0.027	0.003	0.45
7	0.021^{b}	0.020^{b}	0.029^{a}	0.002	0.03
8	0.028	0.021	0.026	0.003	0.18
9	0.028	0.027	0.024	0.003	0.42

Different letters show statistically significant ($P < 0.05$) differences among the treatments.
T1- Treatment 1 (n=13), T2- Treatment 2 (n=13), T3- Treatment 3(n=13)

According to the overall growth rates of this study, significant difference ($P<0.05$) in growth rate of kits was observed in the 4th, 5th and 7th week (Table 1). Significantly lowest growth rate was observed in T1 kits both in the 4th and 5th weeks. This may be due to lack of milk feeding and weaning stress of T1 kits. Furthermore, T1 kits have not developed the digestive system fully when they were weaned at the age of 21 days and transition from milk to solid feed may affect on the

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