EFFECT OF REPRODUCTIVE CONDITION AND SEASON ON PRODUCTIVE PERFORMANCE OF FEMALE RABBITS

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ABSTRACT

The aim of the current study was to evaluate the effect of reproductive condition and season on productive performance of female rabbits. A Kruskal-Wallis test was used to analyze the effects of time of mating (10 to 13, 17 to 20, 24 to 27 and 31 to 42 post-partum days), season (low rainy and rainy periods-RP-) and their interaction on non-parametric variables (receptivity, fertility and mortality rates), while an analysis of variance was used to study the effect on litter size. The results showed a significant association between the four times of mating and the two seasons (P<0. 0001), in the low rainy period, whose ambient temperature is lower receptivity, fertility and mortality rates and, litter size were higher than rainy period (RP). The worst result of receptivity was obtained to mating time 17 to 20 days and RP (76. 7%). Mating time of 24 to 27 days and 31 to 42 days improve the size of the litter at birth and weaning and paradoxically does mated 10 to 13 days postpartum gave better litter size at birth and weaning than other mating times in the rainy period. Our findings suggest that the time of mating postpartum of 10 to 13 days is profitable but the use of other time of mating attending the season are recommended to obtain the best reproductive performance.

Key Words: rabbit, reproduction, band management

INTRODUCTION

The exploitation of rabbits worldwide is remarkable for its numerous advantages in which research work of recent decades highlight in the species the good prolificacy, monogastric herbivore capable of well valorizing forages and transforming plant protein resources into animal protein high biological value that constitutes one of the excellent properties of the quality of its meat (Ouiza, 2016).

In order to be effective and profitable, rabbit-breeding systems must take into account factors such as the size of the farms, the breed or lines and the objective of their production, as well as the diet and environmental conditions in which the production will develop. Moreover, band management procedure needs a maximum harmonization of the physiological condition of the female rabbits of the same band to contribute to increase the optimal performance of the rabbistry (Cherfaoui, 2015).

The aim of the current study was to evaluate the effect of reproductive condition and season on productive performance of female rabbits. In the current experiment, we hypothesise that the adequate choice of reproductive condition is very important for improvement of the reproductive performances in female rabbits does.

MATERIALS AND METHODS

Animals and experimental procedures

This study was carried out with Hybrid New Zealand White and Cuban White Semi-Giant breeding rabbit does at the National Center for the Production of Laboratory Animals. Hybrid New Zealand White and Cuban White Semi-Giant breeding rabbit does were used in this research. Does began the experiment after the fourth parity and were conducted during two season (low rainy period , October - March and the rainy period, April - September).

The breeding conditions were conventional in open north-south facing sheds with gable roof and stool collection pits which are treated with zeolite. Each ship has 258 metal cages of the polyvalent type of 0.75 m^2 with hopper feeder, automatic system of drink by teat and as accessory material plastic nesting is used (width 25 cm, length 49 cm and height of 25 cm) to which sugarcane bagasse is added to it as bedding.

The animals were fed with pelleted concentrated that included the supplementation of the source of vitamins and minerals and the chemical composition of the balanced diet for all categories. The animals had free access to drinking water through the automatic nipple drink system.

The semi-intensive reproductive rhythm was chosen for weekly band management was applied with a cycle of 6 weeks (42 days) with the formation of 6 female rabbits groups that were distributed 20 per group for a total of 120 female rabbits stock and 12 male rabbits. The mating was done 2 times a week (Monday and Wednesday), for which the partum-mating interval of 10 to 13 days was taken as the beginning and the non-receptive does, were mated the following week and correspond to the interval of 17 to 20 days after birth. The diagnosis of pregnancy was done in the time of 13 to 15 days post-mating and the non-pregnant does were again mated and corresponded to the postpartum intervals of 24 to 27 and 31 to 42 days. The weaning took place from 40 to 43 days, females were moved to the adjacent cage and females that were mated outside of their group were moved to the group in which they were mated.

Statistical analysis

A Kruskal-Wallis test was used to analyze the effects of times of mating (10 to 13, 17 to 20, 24 to 27 and 31 to 42 post-partum days),season (tlow rainy and rainy periods) and their interaction on non-parametric variables (receptivity, fertility and mortality rates). While, an analysis of variance was used to study the effects on litter size. The level of significance at which the null hypothesis was rejected was $\alpha=0.05$. Infostat software was used for all analyses.

RESULTS AND DISCUSSION

The results in table 1 showed that there was statistically significant association between the four times of mating and the two seasons ($P<0.0001$). In the low rainy period, whose ambient temperature is lower, sexual receptivity and fertility rates were higher than rainy period (RP). The worst interaction to receptivity was RP and lactating does at 17 to 20 days (76.17%, Table 1). Moreover, fertility was affected negatively by lactation and rainy period (Table 1). Heat temperatures of this season and lactation act as stressors that reduce gonadotropin secretion and affect sexual behavior and reproductive efficiency (Forthun-Lamothe *et al.*, 2000; Tessier *et al.*, 2018). In spite of both negative effects, long days in this period (until 14 light hours) could influence favourably on reproductive performances, avoinding worse results (Vasallo, 2014 and Moumen 2017).

Table 1 Effect of time of mating and season on receptivity and fertility

Indicators	Receptivity (%)		Fertility (%)	
Days postpartum/Season	**LRP**	**RP**	**LRP**	**RP**
10 to 13 days (n=60)	94.22^{cd} (6.77)	84.90^{b} (5.38)	95.10^{bc} (3.86)	84.40^{a} (4.47)
17 to 20 days (n=60)	86.90^{b} (8.82)	76.17^{a} (3.84)	88.33^{abc} (13.33)	83.80^{ab} (18.67)
24 to 27 days (n=60)	95.88^{d} (4.36)	87.76^{bc} (5.30)	95.56^{cd} (11.73)	90.79^{bcd} (18.64)
31 to 42 days (n=60)	97.88^{d} (3.31)	88.36^{bc} (6.97)	100^{d} (0.00)	91.11^{bcd} (16.20)
P-value	P<0.0001			

(n) number
() Standard deviation (SD)
Means with different letters on the same row and column differ significantly
LRP: low rainy period
RP: rainy period

In the intervals of 24 to 27 days and 31 to 42 days the concurrent of lactation-gestation period is low and gonadotropin depression is minor, what allows to improve receptivity, ovulation and implantation rate and, consequently, the size of the litter at birth and weaning (table 2) (Hadid, 2015; Lamothe *et al.*, 2015). As shown in Table 2, paradoxically in the rainy period, does mated 10 to 13 days postpartum gave better litter size at birth and weaning than other mating times in this period (Table 2). Low rainy period show results compatibles with lactation depressor effects derived to reduced competition of nutritional requirements between the offspring and the fetuses (Ouiza, 2016). It is very important to observe the highest mortality obtained to rainy period as consequence of high temperatures and humidity (Combes *et al.*, 2018).

Table 2 Effect of time of mating and season on litter size (at birth and weaning) and mortality

Indicators	Litter size at birth		Litter size at weaning		Mortality (%)	
Days postpartum/Season	**LRP**	**RP**	**LRP**	**RP**	**LRP**	**RP**
10 to 13 days (n=48)	5.63^{ab} (0.41)	5.91^{b} (2.30)	4.79^{b} (0.39)	4.81^{b} (1.82)	14.94^{b} (3.71)	18.37^{cd} (1.49)
17 to 20 days (n=42)	5.92^{b} (0.86)	5.16^{a} (0.27)	4.99^{bc} (0.82)	4.14^{a} (0.29)	15.82^{bc} (2.48)	18.58^{d} (3.01)
24 to 27 days (n=51)	6.16^{b} (0.61)	5.18^{a} (0.39)	5.56^{c} (0.73)	4.73^{ab} (0.42)	9.75^{a} (5.98)	7.80^{a} (7.53)
31 to 42 days (n=54)	6.08^{b} (0.52)	5.01^{a} (0.05)	5.57^{c} (0.55)	4.65^{ab} (0.27)	8.25^{a} (5.28)	7.14^{a} (5.76)
P-value	P=0.0011		P<0.0001		P<0.0001	

(n) number of births
() Standard deviation (SD)
Means with different letters on the same row and column differ significantly
LRP: low rainy period
RP: rainy period

CONCLUSION

Our findings suggest that the time of mating postpartum of 10 to 13 days is profitable but the use of other time of mating, attending the season, are recommended to obtain the best reproductive performance.

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