THE EFFECTS OF REBREEDING INTERVALS ON THE PERFORMANCE CHARACTERISTICS OF DOE (RABBITS)

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Abstract

An investigation was conducted to determine the effect of rebreeding intervals on the performance characteristics of doe. The experiments was designed to test three rebreeding intervals – 7 day, 14 day and 21 day intervals with a view to identifying the optimum breeding interval with respect to the following economic traits – body weight changes during pregnancy, litter weight, litter size, percentage still birth and pregnancy rates. A total of 30 does and 6 bucks of New Zealand White and California crossbreeds were procured for the experiment. Ten does were randomly placed in each of the three treatments groups. The data collected on the parameters were subjected to statistical analysis using S.A.S package. Result obtained indicated that the weekly mean weights of doe during pregnancy were significantly ($P < 0.05$) higher in TI (7 d rebreeding intervals) than in all other treatment groups. Results further indicated that the mean litter weights, mean litter size, percentage stillbirths and pregnancy rates were significantly ($P < 0.05$) higher in does placed on treatment 1 (7 d intervals). Based on these results, therefore, the farmers should be advised to adopt this rebreeding interval in order to maximize the productivity of their rabbits (does) provided efforts are made to reduce the high percentage stillbirths associated with this rebreeding interval.

Key words: doe, rebreeding intervals, performance characteristics, reproductive efficiency

INTRODUCTION

Nigeria, like most developing countries, has been experiencing an ever widening protein deficiency gap (Sonaiya et al., 1997). In the past, several attempts have been made to cushion this gap through increased poultry production but for sometime now, the poultry industry in Nigeria has been experiencing production crises arising mainly from high feed cost which has led to the fold-up of many poultry farms all over Nigeria (Mmereole, 2004). This situation as well as the recent outbreak of bird flu has aggravated the protein crisis in most of the developing countries. As a consequence most of the small scale poultry farmers have shifted to backyard or small scale rabbit production. It has therefore become necessary to find out ways of improving the reproductive efficiency and thus maximize the profitability of rabbit production. Reproductive efficiency in rabbit, like other livestock, is determined by a number of factors such as ovulation rate, conception rate, embryonic mortality and rebreeding intervals (Patridge et al., 1984). It has been estimated that rebreeding intervals is one of the major contributory factors in reproductive efficiency (McNitt and Moody, 1992) because the interval between parturition and remating determines the number of offspring per doe per annum and it makes a whole lot of difference in the total profit a farmer makes in a year. In Europe under the temperate climate, it has been possible to rebreed does between 1 and 9 day-intervals (Mendez et al., 1986). McNitt and Moody (1992) remated at 14 days post partum and successfully achieved 7–8 liters per doe, per annum. With this, it was possible to achieve 45–60 offspring per doe per annum. Iyeghe et al. (2005) carried out an investigation to determine the effect of rebreeding interval on the reproductive performance and body changes of does during pregnancy and concluded that rebreeding does at 14 days post partum increases the willingness of does accepting males which ultimately increases pregnancy rates and thus the number rabbits produced at any one time It is now an established fact that the shorter the rebreeding intervals, the greater the number of rabbits produced (Lebas, 1975). It is known that most of the published works have recommended 14 day-rebreeding interval in humid tropics (Yamani et al., 1987). The major thrust of this investigation is to determine whether rebreeding intervals in does can still be further reduced below 14 days without any deleterious results on the productive performance of the doe.

The study was designed to investigate the effect of early rebreeding on the doe reproductive performance. It is expected that the result of this study will prove a useful guide to the rabbit farmers to stay in business as well as attract perspective farmers into the business and this will ultimately bridge the protein deficiency gap.

MATERIALS AND METHODS

The study was conducted at the Rabbitry unit of the teaching and research farm of Delta State University, Asaba campus. Asaba, which is the capital city of Delta State. Asaba is located at latitude 06°14'N and longitude 06°49'E of Equator. Asaba has rainy season between the months April and October with a mean annual rainfall of 1 500–1 849.3 mm, monthly sunshine is about 4.8 bars and a mean annual temperature of 28.6°C.

The experiment was designed to test three rebreeding intervals with a view to identifying the optimum breeding interval with respect to the following economic production traits: body weight and body weight gains during pregnancy, litter weight and litter size, percentage stillbirths and rate of pregnancy.

A total of 30 Newzealand White X California female and 10 male weaners were procured from Songhai Centre Owerri in Imo state. They were then placed in hutches at the Rabbitry where they were given intensive care including adequate feeding. They were fed balanced diet and supplemented with grasses such as legumes, *Panicum maximum*, and *Tridax spp*.

When the rabbit were stabilized in the new environment, the 30 female rabbits were randomly distri-buted to the 3 test group – re-breeding intervals of 7 days, 14 days, and 21 days post partum – designated as treatment 1(T1) treatment 2(T2) and treatment 3(T3) respectively.

Ten does were allocated to each of the treatment groups and the test was replicated two times in a completely randomized design (CRD).

The rabbits were housed in hutches. Three hutches were used for the experiment and each hutch was demarcated into 3 cages to correspond with the design of the experiment. The experimental rabbits were mated when they started showing signs of sexual maturity which started manifesting at the age of 6–7 months.

At the beginning, the does were mated by taking the doe to the buck. As soon as the doe was taken to the buck, within few minutes, mating was completed. However, where mating was unsuccessful, the doe was taken out from the buck and re-tried later. In so doing all does become pregnant and within 30–32 days all pregnant does kindled. The re-breeding programmer was now carried out in accordance with the design of the experiment. The rabbits in T1 were allowed 7 days post partum before re-breeding, those in T2 were allowed 14 days post partum before re-breeding and those in T3 were allowed 21days re-breeding interval. Data were collected on the initial body weight of the does before pregnancy and weekly Body weight during pregnancy period to obtain weekly body weight and weight gains during pregnancy. After kindling the litter size and litter weight as well as the number of still births were recorded for each treatment group. The data collected were subjected to simple one-way ANOVA based on the following model:

$$X_{ij} = \mu + T_i + e_{ij}$$

where:

Xij	= the i^{th} observation (weight, litter size, litter weight etc)
μ	= over all estimate of the population mean
Ti	= the effect of the i^{th} rebreeding interval
Eij	= random error associated with experimentation.

The analysis was carried out using S.A.S (2002) while significant means were separated by means of least significant difference (LSD).

RESULTS AND DISCUSSION

The formulation of the feeds for the experimental rabbits is presented on Tables 1a and 1b. Table 1a presents the ingredient composition as well as the calculated analysis of nutrient composition of the rabbit growers feeds. Attempts were made to ensure that nutrient requirements of grower rabbits were met by this formulation. Table 1b presents the ingredient composition as well as the calculated nutrient analysis of the feed formulated for the pregnant doe. The diet contains the essential ingredients to meet the requirements of the pregnant doe.

Tab. 1(a): 16% Rabbit grower doe (kg)

Legume lay	50.00
Maize	32.50
Rice offal	5.00
Soya bean	10.00
Bone meal	2.00
Salt	0.50
Total	100.00

Calculated analysis:
Energy = 2 597.21 kcal ME/kg
Crude protein 16%
CF 5.1
Ash 3.3

Tab. 1(b): Pregnant doe diet (kg)

Maize	42.50
Soya bean	5.00
Legume	50.00
Bone meal	2.00
Salt	2.00
	100.00

The effect of re-breeding intervals on the weekly mean body weight of does during pregnancy, the mean litter weight and the litter size as well as the rate of still birth and pregnancy rate were investigated and results were presented in Table 2. From the table it can be observed that the weekly mean body weight of does during pregnancy was significantly ($P < 0.05$) higher in those does placed on treatment1 (TI, 7 d interval) than in all other treatment groups throughout the four weeks of observation. This observation tends to be in agreement with the conclusion of Yamani et al. (1987) that reducing the rebreeding intervals improved the overall productivity of the does. However, Iyeghe et al. (2005) observed that while the does on T1 weighed higher than the does in the other treatment groups at the beginning

Tab. 2: Summary of the results on the performance traits of does at different re-breeding intervals

Parameters	Re-breeding T1(7 days)	Intervals T2(14 days)	T3(21 days)	SEM
Body weight during pregnancy Wk 1(kg)	2.830^{a}	2.150^{b}	2.200^{b}	0.17
Wk2	2.407^{a}	2.237^{b}	2.317^{ab}	0.15
Wk3	2.867^{a}	2.503^{b}	2.483^{b}	0.21
Wk4	3.803^{a}	3.407^{b}	3.517^{b}	0.18
Mean litter birth weight post partum 1d	0.298^{a}	0.225^{b}	0.239^{b}	0.015
7d	0.557^{a}	0.380^{b}	0.397^{b}	0.025
14d	0.857^{a}	0.567^{b}	0.587^{b}	0.98
21d	1.193^{a}	1.086^{b}	0.985^{c}	0.035
Mean litter size postpartum (no) 1d	7.67^{a}	4.67^{b}	5.33^{b}	0.98
7d	5.33^{a}	3.33^{b}	3.33^{b}	0.67
14d	4.33^{a}	3.33^{b}	2.33^{c}	0.96
21d	3.33^{a}	2.33^{b}	1.67^{c}	0.85
Still birth (%)	13.33^{a}	6.07^{b}	3.33^{c}	1.19
Pregnancy rate (%)	89^{a}	68^{b}	62^{b}	10.56

^{a,b,c} means within the same row but with different superscripts are significantly (P< 0.05)

of the pregnancy, towards the end of the pregnancy the does placed on 28 days rebreeding interval had higher body weight than the other treatment groups.

From Table 2 it can be observed that mean litter birth weight tends to decrease with increase in re-breeding interval. Does placed on T1 (7 day interval) produced significantly ($P < 0.05$) the higher litter weight than other treatment groups. This observation tends to agree with the opinion by Partridge et al. (1984) and Lebas et a1. (1986). They reported sharp increases in the growth rate for those litter from T1. This sharp increase in the litter weight of those does in T1 was further buttressed by Fortune-Lamothe et al. (2001) who explained that early weaning provides higher viability and faster growth in weaners. Litter size at birth as presented on Table 2 shows that does re-mated at 7 day intervals had significantly larger litter size at birth than the other treatment groups. Patridge et al. (1984) reported higher values of litter size than values obtained in this study. While Patridge et al. (1984) reported litter size at birth of 8.94, 8.81 and 8.72 for does re-mated at 7 days, 14 days and 21 days respectively, Iyeghe et al. (2005) reported 6.67, 6.80, and 5.80 respectively for the same re-breeding intervals. The variations reported by the different authors have been explained as due to the different strains used in the experiments (Mandez et al. 1986).

In the case of still births, it was observed that the highest number of still births occurred among kits re-mated in 7 days post partum. While the percentage of still births was 13.33% for rabbits re-mated 7 days post partum, the percentage stillbirths for does re-mated at 14 day and 21 day rebreeding intervals were 6.67% and 3.33% respectively. Higher kit mortality rates have been reported. Patridge et al. (1984) reported percentage still birth of 31% and 11% for does re-mated at 14 and 21 days intervals .However, Mandez et al. (1986) reported that stillbirth in does are independent of the re-breeding intervals.

The effect of re-breeding interval on pregnancy rate was also investigated and the result is presented on Table 2. Pregnancy rate decreased with increase in the re-breeding interval, being highest in 7 days re-breeding interval and lowest in 21 days re-breeding interval. Fortur-Lamothe et al. (2001) suggested that the high conception rate observed in the short re-breeding interval (7 days and 14 days) was due to high willingness on the part of does to accept male when the re-breeding intervals is short.

CONCLUSIONS

Based on the result emanating from this study the following conclusion can be drawn; that though rabbit may be re-bred within a wide range of intervals with measurable success, rebreeding interval of 7 days post partum appears to give the best results in terms of high litter weight, high litter size, high conception rate and the total number of kit per doe per annum.

In view of the above therefore, it should be recommended that to maximize profit from commercial rabbit production, the farmer should adopt 7 days re-breeding interval.

REFERENCES

FORTUN-LAMOTHE L. (1997): Effect of dietary fat on the reproductive Performance of rabbit does. A review world Rabbit Sci., 5: 33–38.

IYEGHE-ERAKPOTOBOR G.T., ONYEDIPE E.O, EDUVIE L.O., UGWU D. (2005): Effect of rebreeding interval on reproductive performance and body weight changes of does during pregnancy. Nig. Journal of Animal production, 32 (1):142–152.

LEBAS F. (1975): Effect of feeding level on pregnancy and reproductive performance of doe. Anim. Zootech., 24: 267–279.

LEBAS F, COUDERT P., ROUVIER,R., ROCHAMBEAU H. (1986): The rabbit husbandry, health and production. Anim. prod. and health series, FAO, Rome, pp. 28–36.

MC NITT J.I., MOODY G.L. (1992): A method of weaning kits at 14 days. Journ. of Appl. Rabbit Res., 15: 661–665.

MENDEZ J.; DE BLAS J.C., FRAGA M.J. (1986): The effect of diet and remating interval after parturition on the reproductive performance of commercial rabbit. J. Animal Sci., 62; 1624–1684.

MMEREOLE F.U.C. (2004): Ccooperative hematological and serological profile of the Nigerian local and exotic chickens of southern Nigeria. Ph.D. thesis for the Department of Animal Science, Delta State University Asaba, Nigeria.

PARTRIDGE G.G., ALLAN S.J., FINDLAY M., GINGALL N. (1984): The effect of reducing remating interval after parturition in the reproductive efficiency of the commercial doe rabbit, Anim. Prod.. 39: 465–469.

SONNAIYA E.B; ATUMBI O.A., DARE A.C. (1997): An assessment of health and production costs for small – holder poultry in the South Western Nigeria. In: Sustainable Rural Poultry Production in Africa. African Network for Rural Poultry Development, pp. 89–93.

YAMANI K.A; DADER A.H., ASKAR A. (1987): Effect of remating interval on the performance of rabbit production and reproduction. National Rabbit Project, Academy of Scientific Research & Technology, Faculty of Agriculture, Zagazig University, Egypt.

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