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Effects of Rebreeding Interval on Litter and Doe Performance of Rabbit in Baichi State Nigeria

Research Article

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ABSTRACT

Eighteen primiparous rabbit does comprising of six per breed of New Zealand White (NZW), Chinchilla (CC) and Dutch Belted (DB). They were randomly allocated to three rebreeding interval groups of 7, 14 and 21 days postpartum. Three breeding males, one per breed were used giving a total of 21 rabbits. Significant (P<0.01) doe milk yield in week two (DMY WK2) was observed on rebreeding interval groups. Twenty one (21) day rebreeding group recorded highest (83.1±4.12 g) followed by seven day rebreeding group (72.4±2.30 g) while fourteen day group had the least (69.2±3.31 g). Doe milk yield variability (P<0.01) was evident on the third week with the 21 day rebreeding group had the highest (89.1±5.67 g) followed by fourteen day rebreeding group (77.4±4.56 g) while 7 day rebreeding group had the least (63.9±3.16 g). Doe milk yield in the fourth week also showed variability due to rebreeding groups. The 21 day rebreed group had the highest (61.1±3.57 g) next by 14 day rebreeding group (57.6±2.87 g) while 7 day group had the least (47.7±1.99 g). Significant doe milk yield week one (P<0.05) and week two (P<0.051) were observed to be affected by parity. In week one, parity 4 had the highest milk yield (79.8±5.03 g) followed by parity 5 (75.9±6.75 g) while parity 1 had the least (51.6±3.42 g). In the second week, milk yield was highest (84.9±8.30 g) in parity 5, followed by parity 4 (76.4±6.19 g) while parity 1 had the least (61.7±5.79 g). It was observed that milk yield of rabbits increase with increase in rebreeding interval as well as with increase in parity. Doe and litter parameters were observed better at increasing rebreeding interval among rabbit breeds.

KEY WORDS milk yield, parity, postpartum, rabbit, rebreeding interval.

INTRODUCTION

Rabbit production is one of the most simple and easiest ways of meeting up the demand for animal protein in the diets of over increasing Nigerian people. The neglect of rabbit which is one of the cheapest sources of meat might be attributed to ignorance (De-Blass and Garvey, 1973). Reedy *et al*. (1977) reported that rabbit is very close to modern broiler chickens in terms of growth performance and meat quality. Selection and cross breeding are the cheapest and recognized means of increasing prolificacy of female animals on well established livestock farms. In rabbit, reducing the interval from parturition to mating is one of the viable methods of increasing the output of weaned kittens (Partridge *et al.* 1984). Interaction between remating interval and diet has a significant effect on traits like litter size at birth and weaning, milk production and litter weight (Mendez *et al*. 1986). Despite considerable potential of early remating, prenatal mortality remains one of the major factors limiting productivity in rabbit (Partridge *et al.* 1984). Acute protein malnutrition was reported to be endemic in Nigeria (FAO/WHO 1983). Adekunle and Ajani

(1999) reported that daily animal protein intake per head per day in Nigeria was 8.40 g which is far below the recommended value of 34.0 g (1990). With the cost of beef, mutton and chicken production being the main sources of animal protein Nigeria, it has become imperative to explore other less cost sources of animal protein among which is rabbit. It is the intention of this study to come up with possible ways of increasing rabbit productivity following rebreeding interval, litter weight at birth and weaning, increased milk yield and to reduce litter mortality.

MATERIALS AND METHODS

Eighteen primiparous does comprising of six each per breed of New Zealand White (NZW), Chinchilla (CC) and Dutch Belted (DB) with corresponding per breed average weight of 2.16 kg, 1.73 kg and 1.63 kg at an average age of 5 to 6 months. Three breeding bucks, on one per breed basis were used for mating throughout the study period. The does were randomly allocated to 7, 14 and 21 days postpartum breeding intervals. Animals were obtained from the teaching and research farm of the Federal Polytechnic Mubi where records were adequately kept.

Animal management

Animal were fed on forages comprising of ground nut and cowpea husk, *Tridax precumbens*, *Centrosoma pubesans*, *Amaranthus spp.* and carrot leaves. The rabbit feed were supplemented with a mixture of groundnut cake, amize and rice offals at 120 g per day per animal throughout the research period. Clean and pure water besides feeds were offered *ad libitum* to all animals.

Housing

Each female rabbit was housed in a metal cage where the floor and roof was covered with 1.5 cm wire mesh. The cages measured 90×60×50 cm sizeable for cleaning and to allow for the feces dropping freely. The cages were kept in a house with aluminum roof, where ventilation was adequate with good passage for light transmission. The house was well electrified.

Mating procedure

Stud mating was adopted for the study where females of each breed was carried to a buck of the same breed kept in a breeding/mating pen of 1.5 m^2 for breeding convenience. Mating was done 7-8 am in the morning and 5-6 pm in the evening by which times temperature were low. Palpation for pregnancy was carried out 14 days post mating as described by (Fielding, 1991). Does that failed to be conceived were remated immediately.

Data collection

Using 20 kg pan scale, doe initial weights were recorded, at mating and at weekly intervals during pregnancy and weight after kindling were measured. Doe partial milk (DPMY) was also measured using the weigh-suckle-weigh method (Partridge *et al*. 1986 and Parigi-Bini *et al*. 1990). Litter weight at birth and weekly weight up to weaning at 28 days were measured using electric sensitive scale. Litters size at birth and alive at birth and on weekly bases were recorded up to weaning.

Data analysis

Data were subjected to analysis of variance, one way ANOVA of the General Linear Model Procedure of Statistical Analysis System (1999). Rebreeding intervals of days 7, 14 and 21; parity and breed were considered the major and independent factors while the doe and litter parameters were dependent factors.

RESULTS AND DISCUSSION

Effect of rebreeding interval on doe parameters is shown on Table 1. Significant (P<0.01) doe milk yield weeks one to three effect were observed across the rebreeding groups. Doe milk yield week 2 was highest (83.1±4.12 g) in 21 days rebreeding group followed by seven days rebreeding group (72.4±2.30 g) while 14 days rebreeding interval had the least (69.2±3.31 g). Doe milk yield week 3 had highest value (89.1±5.67 g) in 21 days rebreeding groups followed by 14 days group (77.4±4.56 g) while 7 days rebreeding group had the least (63.9±3.16 g). Doe milk yield week 4 followed the same pattern as week 3 with 21 days rebreeding groups had highest (61.1±3.57 g) then 14 days group (57.6±2.87 g) while least (47.7±1.99 g) value was recorded on 7 days rebreeding group. Most doe parameters could not show significant variability.

The significant milk yield variability observed among the rebreeding groups during weeks two, three and four of lactation might be attributed to the influence of the rebreeding intervals on the physiological status of the does. Milk was generally observed highest among the 21 days rebreeding group which may likely be due to the ability of the does to have had enough time to accumulate more body reserves/nutrients from feeds before breeding, these findings were in agreement with the report of and Lebas *et al*. (1997) who found that the superiority of the 21 days rebreeding groups over others was due to their ability to store more body reserve before pregnancy. Similar observations was also reported by long (1981) and Peinado *et al*. (1988).

Table 1 Effect of rebreeding interval on doe parameters (Means±SD)

Parameters	Rebreeding intervals (days)			
	7	14	21	Level of Significance.
Doe weight at mating (kg)	2.0±0.06	2.0±0.09	2.1±0.11	NS
Doe weight 7 days pregnant (kg)	2.1±0.06	2.2±0.09	2.1±0.11	NS
Doe weight 14 days pregnant (kg)	2.0±0.06	2.1±0.09	2.2±0.11	NS
Doe weight 21 days pregnant (kg)	2.2±0.06	2.3±0.08	2.3±0.10	NS
Doe weight 28 days pregnant (kg)	2.4±0.05	2.4±0.08	2.4±0.10	NS
Doe weight at kindling (kg)	2.3±0.17	2.2±0.24	2.2±0.30	NS
DMY-WK-1 (g)	65.6±1.87	63.5±2.69	70.7±3.35	NS
DMY-WK-2 (g)	72.4±2.30	69.2±3.31	83.1±4.12	**
DMY-WK-3 (g)	63.9±3.16	77.4±4.56	89.1±5.67	**
DMY-WK-4 (g)	47.7±1.99	57.6±2.87	61.1±3.57	**

**: P<0.01.
NS: not significant.
DMY-WK-1-4: Doe milk yield at week-1 to 4.

The non significant effect of most doe parameters observed in this study might be attributed to the steady management of the animals throughout the research period which might have masked the differences.

Effect of parity on doe parameters was also studied (Table 2). Significant (P<0.05) milk yield week 1 effect was observed on parity. Parity 4 had the highest yield (79.8±5.0 g) followed by parity 5 (75.9±6.75 g) while parity 1 had the least (51.6±3.42 g) significant (P<0.01) milk yield difference week 2 on parity was depicted. Milk yield was observed highest on parity 5 (85.9±8.30 g) followed by parity 4 (76.4±6.19 g) while parity 1 had the least yield (55.3±4.21 g). Generally milk yield was observed to increase with increasing parity. Other parameters however, could not show any significant variability due to parity.

died. Significant (P<0.001) breed difference on doe weight at mating was pronounced. New Zealand White (NZW) bred had the highest (2.5±0.12kg) followed Chinchilla (1.9±0.06 kg) while Dutch Belted breed had the least (1.6±0.07 kg). Significant (P<0.001) breed variability on doe weight at seven days of pregnancy was also observed. Highest weight (2.6±0.12kg) was depicted on NZW followed by Chinchilla (2.0±0.06kg) while Dutch Belted had the least weight (1.8±0.07kg). Significant (P<0.001) breed differences on doe weight at 14, 21 and 28 days of pregnancy were also recorded following the same pattern as at 7 days of pregnancy. The corresponding highest weight (2.5±0.12kg, 2.6±0.11 and 2.8±0.11kg) was observed on NZW followed by Chinchilla (1.9±0.06kg, 2.1±0.06kg and 2.3±0.06kg) while least values was recorded on Dutch Belted (1.8±0.07kg).

Table 2 Effect of parity on doe parameters (Means±SD)

Parameters	Parity					
	1	2	3	4	5	Level of significance
DWM (kg)	2.0±0.11	2.1±0.08	2.1±0.08	2.1±0.16	2.0±0.21	NS
DW-7DP (kg)	2.1±0.11	2.1±0.08	2.2±0.08	2.2±0.16	2.2±0.21	NS
DW-14DP(kg)	2.2±0.11	2.0±0.08	2.1±0.08	2.0±0.16	2.2±0.02	NS
DW-21DP(kg)	2.3±0.10	2.2±0.07	2.2±0.08	2.2±0.15	2.3±0.20	NS
DW-28 DP(kg)	2.4±0.10	2.3±0.07	2.4±0.007	2.4±0.14	2.4±0.19	NS
DWK (kg)	2.0±0.31	2.2±0.22	2.3±0.24	2.2±0.46	2.0±0.61	NS
DMY-WK1(g)	51.6±3.42	58.7±2.38	67.0±2.63	79.8±5.03	75.9±6.75	*
DMY-WK2(g)	55.3±4.21	62.1±2.93	75.1±3.23	76.4±6.19	84.9±8.30	**
DMY-WK3(g)	61.7±5.79	65.6±4.01	80.0 ±4.45	89.1±8.85	87.5±11.43	NS
DMY-WK4(g)	50.1±3.64	50.3±2.53	55.3±2.80	61.2±5.36	60.32±7.19	NS

*:P<0.05; **:P<0.01.
DWM: Doe weight at mating; DW-7-28DP:Doe weight at 7 to 28 days pregnant; DWK:Doe weight at kindling; DMY-WK1-14:Doe milk yield at week 1 to 4.

The significant milk yield differences due to parity observed during weeks 1 and 2 of lactation might be due to the milk yield pattern with respect to parity. Milk yield in rabbit usually reaches its peak during weeks 1 and 2 of lactation. This study agrees with the report of Long (1981) and Peinado *et al.* (1988). The influence of good husbandry management might have suppressed the possible variances in most of the doe parameters due to parity in this study. Effects of breed on doe parameters (Table 3) were also studied.

Significant (P<0.001) breed difference on doe weight at kindling was also observed. New Zealand white rabbit had the highest (2.0±0.35 kg) followed by Chinchilla (1.7±0.20 kg). Significant breed variations on doe milk yield week 1 to 4 were recorded. The NZW rabbit had the highest milk yield across the 4 weeks with the corresponding values as follows: 81.4±3.84 g, 92.0±4.72 g, 93.9±6.50 g and 62.4±4.09 g., the next corresponding milk yield value was recorded for chinchilla rabbit; 61.3±2.01 g, 68.6±2.47 g, 70.9±6.50 g and 56.4±2.14 g., the least milk yield values were evident on Dutch Belted rabbit with respective values weeks 1 to 4 were; 57.2±2.16 g, 64.2±2.66 g, 65.5±3.66 g and 47.5±2.30 g.

parameter showed no significant variability among the three breeds studied.

The significant litter size at birth observed in this study might be attributed to the inherent breed variability in litter size as reported by Gugushvill (1983). Poor plane of nutrition, adoptability and some extremes of environmental temperatures also contribute to litter size in rabbit (Gregory, 1932). The variability observed among rabbit breeds on litter size at 7 and 14 days might be attributed to the mothering ability of the different breeds.

Table 3 Effect of breed on doe parameters (Means±SD)

Parameters	Breed			
	NZW	CC	DB	Level of significance
DWM (kg)	2.5±0.12	1.9±0.06	1.6±0.07	***
DW-7 DP (kg)	2.6±0.12	2.0±0.06	1.8±0.07	***
DW-14 DP (kg)	2.5±0.12	1.9±0.06	1.8±0.07	***
DW-21 DP (kg)	2.6±0.11	2.1±0.06	2.0±0.06	***
DW-28 DP (kg)	2.8±0.11	2.3±0.06	2.1±0.06	***
DWK (kg)	2.0±0.35	2.0±0.18	1.7±0.20	***
DMY-WK1 (g)	81.4±3.84	61.3±2.01	57.2±2.16	***
DMY-WK2 (g)	92.0±4.72	68.6±2.47	64.2±2.66	***
DMY-WK3 (g)	93.9±6.50	70.9±6.50	65.5±3.66	***
DMY-WK4 (g)	62.4±4.09	56.4±2.14	47.5±2.30	***

***:P<0.001.
NZW: New Zealand White; CC: Chinchilla; DB: Dutch Belted; DWM: Doe Weight at Mating; DW-7-28 DP: Doe weight at 7-28 days pregnant; DWK: Doe weight at kindling; DMY-WK1-4: Doe milk yield week 1-4.

Table 4 Effect of breed on some litter parameters (Means±SD)

Parameters	Breed			
	NZW	CC	DB	Level of significance
LSB	4.3±0.43	5.6±0.25	4.4±0.27	**
LS-7DP	3.0±0.64	5.0±0.34	3.8±0.36	*
LS-14DP	2.6±0.66	4.5±0.34	3.3±0.37	*
LS-21DP	2.6±0.72	4.2±0.38	3.2±0.14	NS
LS-28DP	2.6±0.69	3.8±0.36	3.2±0.39	NS
ALWB (g)	287.6±39.92	328.3±20.92	298.8±32.45	NS
LW-7DP (g)	372.5±50.62	429.9±26.52	452.9±28.47	NS
LW-14DP (g)	353.4±74.18	563.8±38.87	532.7±41.72	*
LW-21DP (g)	449.0±90.34	663.8±47.34	621.4±50.81	NS
LW-28DP (g)	676.0±16.27	771.8±60.93	775.5±65.40	NS
ALWW (g)	260.0±58.64	203.1±30.65	246.2±32.90	NS

*: P<0.05, **: P<0.01, NS: not significant.
NZW: New Zealand White; CC: Chinchilla; DB: Dutch Belted; LSB: Litter size at birth; LS-7-28DP: Litter size at 7-28 days post partum; ALWB: Average litter weight at birth; LW-7-28DP: Litter weight at 7 to 28 postpartum; ALWW: Average litter weight at weaning.

The significant breed differences on doe weight at mating observed in this study might be due to the inherent breed differences in weight which corresponds with the report of Iyeghe-Erakpotobor *et al*. (2001), Odubote and Akinokun (1991) and Orheruata and Ojo (1999). The significant breed variability on doe weight at 7, 14, 21 and 28 days of pregnancy recorded in this study might be attributed to many factors among which are the inherent breed differences in weight, number fetuses and nutrition. In support of these findings was the report of Orunmuyi *et al*. (2001) who observed differences in weight among rabbit due to number of fetuses.

The milk yield variability among the rabbit breed observed might be related to body size and the number fetuses besides nutrients availability for the animal. Similar observations were also reported by Rajadevan *et al*. (1986).

Significant (P<0.05) breed differences on litter weight at 14 days postpartum was made evident. Chinchilla had the highest (563.8±38.87 g) litter weight at 14 days postpartum followed by Dutch Belted breed (532.7±41.72 g) while NZW had the least (353.4±74.18 g). Generally most litter

The significant litter weight differences at 1day postpartum recorded among rabbit breed in this study might be an attribute to litter size at 14 days postpartum which is in line with the report of Orunmuyi *et al*. (2001).

This study concludes that milk yield of rabbits increase with increase in rebreeding interval as well as with increase in parity. Doe and litter parameters were observed better at increasing rebreeding interval among NZW, CC and DB rabbits breeds considered for the study.

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