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Effect of remating interval on the performance of rabbit production and reproduction

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SUMMARY - The study was carried out on 30 does of NZW rabbits in three groups mated 1, 5 or 10 days after parturition to examine the effect of remating intervals on some productive and reproductive traits. Remating interval showed a significant effect ($P < 0.05$) on conception rate, milk conversion during first week and litter daily gain in the period from 22-25 days and a highly significant effect ($P < 0.01$) on milk yield during the third week of age only. In general, the does mated 5 days postpartum recorded slightly higher litter size at birth (7.8) or at weaning (5.6), higher milk yield (3313.8 g total yield in 25 days) and heavier litter weight (2052.2 g at weaning) than does mated 1 or 10 days. The does mated 5 days postpartum showed slightly lower stillbirths (2.8%), preweaning mortality (19.2%) and mean bunny weight (379.6 g at weaning) than the other two experimental groups. In contrast, does mated 10 days after parturition showed the highest percent of conception (89.9%).
Key words: Rabbit, reproduction, production, remating interval.

RESUME - "Effet de l'intervalle mise bas-saillie sur les performances des lapines en production et reproduction". Une étude a été menée sur 30 lapines de race Néozélandaise Blanche distribuées en 3 groupes et saillies 1, 5 ou 10 jours après la mise bas, afin d'étudier les effets des intervalles mise bas-saillie sur certains caractères de production et reproduction. L'intervalle mise bas-saillie a eu un effet significatif ($P < 0,05$) sur le taux de conception, l'indice de transformation laitière pendant la première semaine et le GMQ de la portée pendant la période 22ème-25ème jours ; un effet très significatif ($P < 0,01$) sur la production de lait uniquement pour la troisième semaine d'âge. En général, les lapines saillies 5 jours post-partum ont montré des tailles de portée légèrement supérieures à la naissance (7,8) ou au sevrage (5,6), un rendement laitier plus important (3313,8 g de production totale en 25 jours) et un poids de la portée plus élevé (2052,2 g au sevrage) que les lapines saillies à 1 ou 10 jours. Les lapines saillies 5 jours postpartum ont montré un peu moins de mortinatalité (2,8%), de mortalité pré-sevrage (19,2%), et un poids moyen des lapereaux un peu plus faible (379,6 g au sevrage) que les deux autres groupes expérimentaux. Par contre, les lapines saillies 10 jours après la mise bas ont présenté le taux de conception le plus élevé (89,9%).
***Mots-clés :** Lapin, reproduction, production, intervalle mise bas-saillie.*

Introduction

One of the most interesting principles in the management of farm rabbits, is selection of the suitable time of mating after parturition especially under the intensive production system.

If the remating interval, the period from kindling to remating is reduced, it may offer the greatest opportunity for increasing the output of weaned rabbits for the doe in comparison with genetic improvement to identify prolific strains (Partridge, *et al*, 1984). However, the informations about the suitable time of mating under the intensive production are scanty. The present work was carried out to examine the effect of remating interval under intensive (1 day after parturition) and semi-intensive conditions (5 or 10 days after parturition) according to Lebas *et al.* (1986) on some productive and reproductive traits of rabbits.

Material and methods

This work was carried out on the foundation stock of New Zealand White rabbit in the National Rabbit project, Faculty of Agriculture, Zagazig University, Egypt. Thirty does rabbits were used in the present work aging 5 months and of 3.5 kg mean body weight. The animals were ranked according to body weight and then allocated evenly to three treatment groups to be remated either 1, 5, 10 days postpartum over a one year production cycle started in March 1987.

The does were housed under intensive production system in individual cages of a

commercial type (59 x 55 x 39 cm) provided with feeders, automatic drinkers and nest box (40 x 32 x 29 cm). The cages were stabilized into a conventional unheated windowed building. The building was naturally ventilated but provided with sided electric fans. The animals were lighted 14-16 hours per day throughout the experimental year.

The animals were reared under similar environmental conditions. They were fed on a pelleted diet which contained approximately 16.3% crude protein, 2.5% crude fat and 14.0% fiber. There was also a rabbit premix composed of minerals and vitamins in the pelleted ration to provide balanced nutrients requirements. Restricted feeding was practiced whenever the doe was without a nursing litter, including gestation. The animals received 180 to 240 g daily of diet according to environmental temperature. In late pregnancy (day 24 onwards) and throughout lactation the diet was offered ad-libitum.

Rabbits were provided clean fresh water by a nipple drinker all the time.

All the does were mated with NZW bucks of proven fertility. The doe was transferred to the buck's pen at the time of service for a short period. Forced mating was performed if the doe refused to accept the buck without restraint. All does were mated twice whenever possible.

Does were checked every morning and the dead pups were removed from the nestbox.

The does were weighed at mating and at kindling and litter weight at birth and weekly after parturition was measured. The young rabbits were weaned after twenty five days from birth in all treatment groups. Milk yield measurements were made for the does in all treatment groups. Estimation of this trait began from young birth until weaning. The youngs were deprived of suckling for 24 h by separation between them and their mothers. Thereafter, the pups were weighed to the nearest gram before suckling. After suckling was completed the youngs were weighed again. The increase in pups weight was indicated as well as the milk yield. Statistical analysis was performed according to Snedecor and Cochran (1982).

Results and discussion

The results of the effects of remating interval on conception rate (C.R.), gestation period (G.P.), litter size at birth (LSB), and at weaning (LSW), stillbirths (SB) and preweaning mortality (PM) are presented in Table 1.

It could be observed that the group of does which were mated 10 days after parturition showed the highest percent of conception, while 5 days remating interval gave the least conception rate. The differences in conception rate due to remating interval were significant. Similar results were obtained by Perry (1983) and Mendez *et al.* (1986).

The average length of the gestation period was found to be unaffected by the mating system, however, slight differences were noticed.

The present results showed that the average litter size at birth was 7.0, 7.8 and 7.7 for does which were mated 1, 5 or 10 days after parturition, respectively. The differences among treatment groups were not significant. Also, insignificant effects for remating intervals on litter size at birth were reported by Partridge *et al.* (1984) and Szendro (1988). On the contrary, Perry (1983) reported significant differences in litter size at birth due to remating interval.

The present results revealed that the effect of remating interval on litter size at weaning was found to be insignificant. However, does which were mated 5 days postpartum had a slight increase in litter size at weaning; this might be attributable to the highest litter size at birth and to the lowest preweaning mortality rate in this group of does in relation to what was occurring in the other groups. In agreement with the present findings, previous studies elsewhere (Martin and Denal, 1976 and Mendez *et al.*, 1986) reached the same conclusion of the present results.

Results of Table 1 showed that stillbirths and preweaning mortality were not significantly affected by remating interval, though does that were mated 5 days after parturition showed lower birth and preweaning mortality rates than does mated 1 or 10 days after parturition. The results were in fair agreement with those obtained by Martin and Donal (1976).

Regarding the effects of remating intervals on milk yield, Table 2, it was noticed that the does mated 5 days postpartum recorded higher milk yield than does mated 1 or 10 days postpartum. This was noticed in the whole period (0-25 days) except in the last three days (22-25) where milk yield was higher in the group mated 10 days postpartum. Statistical analysis of data showed that the differences in milk yield amongst the different groups were not significant except at the third week where the differences were highly significant.

The elevated milk yield in the 5 days remating interval group could probably be attributed to the low kindling frequency associated with the low conception rate in this group of does.

Milk conversion at first week only was significant ($P < 0.05$), decreased for does mated 10 days postpartum with respect to that of does mated 5 days postpartum. Research work concerning the effects of remating interval on milk yield and milk conversion was very scanty in the literature except that of Lammers *et al.* (1988) who reported that does mated 42 days after parturition recorded higher milk yield than does mated 33 days postpartum.

Table 1. Means ($\overline{X}$), standard errors (S. E.) and coefficients of variability (C. V.) of conception rate %, gestation period, litter size at birth, litter size at weaning, stilbirths % and preweaning mortality % as affected by remating interval.

Traits	No. of births	Remating interval		
		1-Day (58)	5-Day (55)	10-Day (61)
Conception rate %	$\overline{X}$	70.9	68.4	87.9
Gestation periods (days)	$\overline{X}$	32.4	32.2	32.7
	S. E.	0.1	0.1	0.2
	C. V.	3.0	3.2	4.3
Litter size at birth	$\overline{X}$	7.0	7.8	7.7
	S. E.	0.2	0.3	0.4
	C. V.	24.0	30.8	35.8
Litter size at weaning	$\overline{X}$	5.1	5.6	5.3
	S.E.	0.2	0.3	0.3
	C.V.	34.5	33.9	38.5
Stillbirths %	$\overline{X}$	5.1	2.8	4.1
Preweaning mortality %	$\overline{X}$	20.6	19.2	22.3

Table 2. Means ($\overline{X}$), standard errors (S. E) and coefficients of variability (C. V.) of weekly and total milk yield per doe and milk conversion as affected by remating interval.

Traits		No, of births	Remating interval		
			1-Day (58)	5-Day (55)	10-Day (61)
Milk Yield (gm),					
	1st week	$\overline{X}$	644.8	677.7	624.4
		S. E.	24.7	26.9	23.7
		C. V.	29.2	29.4	29.6
	2nd week	$\overline{X}$	977.1	1035.7	984.3
		S. E.	43.0	38.2	35.2
		C. V.	33.5	27.4	27.9
	3rd week	$\overline{X}$	1005.6^{b}	1163.4^{m}	1146.4^{m}
		S. E.	48.4	44.3	41.1
		C. V.	36.7	28.2	28.0
	22-25 days	$\overline{X}$	427.8	437.0	468.6
		S. E.	22.7	19.6	18.3
		C. V.	40.5	33.2	30.4
	0-25 days	$\overline{X}$	3055.8	3313.8	3223.9
		S. E.	117.9	114.0	111.0
		C. V.	29.4	25.5	26.9
Milk conversion					
	1st week	$\overline{X}$	1.83^{mb}	1.92^{m}	1.75^{b}
		S. E.	0.04	0.05	0.06
		C. V.	18.40	18.00	25.30
	2nd week	$\overline{X}$	2.01	2.10	2.26
		S. E.	0.08	0.05	0.06
		C. V.	30.80	16.90	22.30

mean values in the same row bearing the same superscripts did not significantly differ from each other, otherwise they differ ($P \leq 0,05$).

The results of the remating interval effects on litter weight, litter daily gain and mean bunny weight are presented in Table 3. It could be noticed that does mated 5 days after kindling recorded higher litter weight than those mated 1 or 10 days after kindling, but the differences were not statistically significant except at weaning (25 days of age). This may be due to the good health and efficiency which resulted from the low rate of kindling in does mated 5 days after parturition. The significant effect of remating interval was confined only to the daily litter weight gain in the period from 22-25 days of preweaning growth period in favor of the 5 days remating interval. It could be noticed generally that consistent trends were observed in this trait due to remating interval. Similar findings were reported by Kawinska and Niedzwiadek (1975). At the same time, Mendez *et al.* (1986) found that litter weight at 21 days of age averaged 2000.0 g in does mated immediately after kindling corresponding to 1635.2 g in the present study.

Values of mean body weight in does mated 1 and 10 days postpartum were similar in all stages of the suckling period, and both treatment groups were higher than that of 5 days remating interval; however the differences were not statistically significant.

These results agreed with Kawinska and Niedzwiadek (1975) who reported that mean offspring weight at birth for does mated 10-20 days after kindling was greater than that of those mated 4-7 days after kindling.

In conclusion, the obtained results discussed through the present study on the effect of remating interval on some productive and reproductive traits of NZW doe rabbit may show that the differences in most traits studied had a small range, but the group of does mated 10 days after parturition showed the highest percent of conception. It could be concluded from these results that the does may be remated 10 days after parturition. However, further studies should be carried out on this subject to confirm the above results.

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Tabla (3) Means ($\overline{X}$), standard errors (S.E.) and coefficients of variability (C.V.) of the effect of remating interval on litter weight, litter daily gain and mean bunny weight.

Traits	No. of births	Remating interval		
		1-Day (58)	5-Day (55)	10-Day (61)
Litter weight (gm).				
Ar birth	$\overline{X}$	394.2	421.7	403,2
	S. E.	14.7	18.2	6.2
	C. V.	28.3	32.0	31.3
7 days	$\overline{X}$	635.6	710.4	694.0
	S. E.	28.2	31.4	28.0
	C. V.	30.9	32.8	31.6
14 days	$\overline{X}$	1185.1	1189.2	1119.0
	S. E.	48.0	48.6	43.7
	C. V.	30.9	30.3	30.5
21 days	$\overline{X}$	1635.2	1685.5	1620.7
	S. E.	64.0	64.3	62.2
	C. V.	29.8	28.3	30.0
0-25 days	$\overline{X}$	1885.1^{b}	2052.2^{m}	1937.5^{ab}
	S. E.	73.1	80.6	75.4
	C. V.	29.5	29.1	30.4
Litter daily gain (gm).				
1*st* week	$\overline{X}$	51.3	51.4	53.0
	S. E.	2.0	2.2	2.3
	C. V.	29.1	32.0	33.9
2*nd* week	$\overline{X}$	74.1	72.5	64.5
	S. E.	3.7	3.0	2.7
	C. V.	37.7	31.1	32.5
3*rd* week	$\overline{X}$	71.7	74.3	77.0
	S. E.	3.8	3.2	3.3
	C. V.	40.1	31.9	33.7
22-25 days	$\overline{X}$	72.6^{b}	102.2^{m}	84.8^{b}
	S. E.	4.5	5.5	4.7
	C. V.	47.6	40.1	43.6
0-25 days	$\overline{X}$	67.7	75.1	69.3
	S. E.	2.2	2.7	2.7
	C. V.	25.2	26.8	30.3
Mean bunny weight (gm).				
At birth	$\overline{X}$	57.4	42.2	55.6
	S. E.	1.5	1.9	1.5
	C. V.	28.3	24.7	21.6
7 days	$\overline{X}$	125.8	119.2	129.5
	S. E.	3.4	4.0	4.7
	C. V.	20.7	25.0	28.7
14 days	$\overline{X}$	224.8	209.2	221.3
	S. E.	6.6	6.8	8.9
	C. V.	22.4	24.2	31.3
21 days	$\overline{X}$	324.5	306.0	332.7
	S. E.	10.5	10.7	14.1
	C. V.	24.6	26.0	33.1
0-25 days	$\overline{X}$	386.2	379.6	400.2
	S. E.	12.6	13.2	16.2
	C. V.	24.8	25.8	31.6

mean values in the same row bearing the same superscripts did not significantly differ from each other, otherwise they differ ($P \leq 0.05$)