THE RELATIONSHIP BETWEEN NEW ZEALAND WHITE RABBIT MANAGEMENT AND PRODUCTIVITY

By

T. M. Mousa-Balabel

Dept. of Hygiene and Preventive Med., Fac. of Vet. Med., Tanta University, Egypt.

SUMMARY

The present work was carried out in a private rabbitry in Minufiya Governorate, Egypt. A number of 43 New Zealand White rabbit (40-does with an average age 9 months and 3- bucks; their age ranged from 4 to 8 months) were used in this work to study the effect of age of buck at first mating , number of services and post-partum re-mating intervals on their productivity. These animals were divided randomly into three groups. The first group contained 12 doe rabbits and divided into three equal subgroups to investigate the effect of number of services (one and two services from one or two different bucks) on their productivity. The second group contained 12- does and 3 bucks (the bucks average ages are 4 , 6 and 8 months) and divided into three equal subgroups (each subgroup contained 4 does and one buck) to study the effect of age of buck at first mating on their productivity. While, the third group contained 16 doe rabbits and divided into four equal subgroups to study the effect of post-partum re-mating intervals (1, 5, 10 and 15 days post-partum intervals) on their productivity.

The conception rate, litter size and litter weight at birth and weaning were increased when used an adult buck rabbits whose ages 6 months or more and their does mated by two services from one or two different bucks with re-mating intervals 10 and 15 days post-partum and decreased when used a young buck rabbit less than 6 months of age and their does mated by one services with re-mating intervals 1 and 5 days post-partum . The gestation period showed insignificant differences among different ages of bucks , number of services and post-partum remating intervals. While, the pre-weaning mortality percentages were decreased by using bucks whose ages 6 months or more and the does mated by two services from one or different two bucks, with re-mating intervals 10 and 15 days post-partum.

From this study, we conclude that the productivity of rabbits can be improved by some managemental aspects

especially under intensive productive program as; good selection of the suitable age of buck at first mating (not less than 6 months) , making double mating from different two bucks and the re-mating interval post parturition not less than 10 days.

INTRODUCTION

One of the most important basis in rabbits management, is the selection of; suitable age of bucks at first use, mating system and the time of re-mating after kindling, especially under the intensive productive system. Age of Californian and New Zealand White bucks at first mating ranged between 140 and 150 days (*Daader et al., 1999*), as well as, the ejaculate characters for young bucks (8 months) was lower than that for old ones (11 months) (*Hoogenkamp, 1975*) . So, the performance of buck rabbits per year was more in adult than young (*Hattenhauer et al., 1977*). The age and body weight of buck rabbit at the time of mating were affecting the pregnancy rate and the body weight of their progeny (*Miros and Tots, 1974*). The conception rate and number of offsprings per does were higher when two services from two different bucks were performed than those inseminated from one buck (*Nelson et al., 1979* and *Rashwan and Gaafary, 1992*) and the best conception rate was obtained when the does were mated immediately once again after the first mating (*Szendro et al., 1984*), although , some breeder tended to make the double mating with several hours interval between the two mating *(Toson et al., 1995)* In contrast, *Arrington and Kelly (1976)* and *Khalifa (1994)* mentioned that there was no advantage from the second mating as, the sperm cells from the first mating remain viable for several hours and had no effect on any of the reproductive traits.

The doe has a fertile period immediately after kindling , this period used in intensive productive system (*Diaz et al., 1988*). If the remating interval is reduced, it may offer the greatest opportunity for increasing the output of weaned rabbits for the doe (*Partridge et al., 1984*). Remating intervals showed a significant effect on the conception rate, milk yield and litters daily gain (*Yamani et al., 1992*) as, early mating of the doe rabbits at 4 days post-partum allowed a shorter parturition intervals (39.9 days) and a higher prolificacy (9.07 young rabbits born a live per litter) and tended to reduce the number of young rabbits born dead (0.52%) (*Nicodemus et al., 2002*). In spite, *Cervera et al. (1993)*

recorded that the doe rabbits with small litters conceived earlier than those with large litters (the litter size that affect the remating intervals rather than the reverse). The doe rabbits which mated early after kindling had lower litter size, conception rate, gestation period and litters weight at weaning (*Tawfeek, 1995*). However, the does performance decreased by lactation (*Fortun and Prunier, 1999*) and the rate of acceptance of the buck rabbits by the does decreased as the remating interval increased, in addition to the conception rate and litter size were increased if remating interval increased (*Lopez et al., 1994*) .

The aim of the present work was to study the effect of age of bucks at first using , number of services and post-partum remating intervals on the rabbits productivity.

MATERIALS AND METHODS

The present work was carried out s in a private rabbitry in Minufiya Governorate, Egypt. The experimental work started in September 1, 2002 up to May ,2003. A number of 43 New Zealand White rabbits (40 - does with an average age 9 months and 3 - Bucks, their age ranged from 4 to 8 months) were used in the present work. These animals were divided randomly into three groups. The first group contained 12 does and divided into three subgroups (4 each) to investigate the effect of the number of services (one service , two service from the same buck and two service from two different bucks) on their productivity. The second group used to study the effect of age of bucks at first mating on their productivity, it contained 12 - does and three bucks (the bucks average ages are 4 , 6 and 8 months), this group was divided into three equal subgroups (4- does and one buck each). While, the third group contained 16 does and divided into four equal subgroups (4 each) to study the effect of post-partum re-mating intervals on their productivity. The does in the first subgroup were re-mated one day after kindling and in the second subgroup re-mated after five days from kindling. While, in the third subgroup re-mated after 10 days and in the fourth one re-mated after 15 days from kindling. All rabbits were housed individually in commercial hutches (60 x 55x 40 cm) provided with feeders and automatic drinkers and anestbox (40 x 30 x 30 cm) and fed a commercial pelleted diet of 16.5% crude protein, 2.5% crude fat and 14% fibers (Cairo Company). The diet was offered twice daily at 9 a.m. and 5 p.m. with adlibitum amount and provided with the drinking water.

All the does except that in the second group were mated by well examined New Zealand White bucks of proven fertility.

Measurements:
Conception rate, Gestation period, litter size, individual kits weight at birth and weaning and preweaning mortality percent.
N. B.: The weaning was done at 4 weeks from birth in all groups.

Statistical Analysis:
Data were collected, arranged, summarized and analyzed using the general linear model procedures of the *SAS, Institute INC (1985).*

RESULTS AND DISCUSSION

Data in table (1) showed that, the conception rate was affected by the age of bucks and mating system as; the conception rate significantly increased by increasing the age of buck (75% for buck of an average age four months, and 100 % for bucks of an average ages six and eight months). These results were coincided with that of *Miros and Tots (1974).* As well as, the conception rate was higher (100%) by applying two services from two different bucks than using one or two services from one buck (75%) as shown in table (2). In addition, the re-mating intervals affecting the conception rate as; the higher percent of conception rate (100%) was recorded in does re-mated after 10 and 15 days post-partum followed by those re-mated in the first day post-partum (75%) and the lowest conception rate (50%) was recorded in does re-mated after 5 days post-partum (Table 3) . These results were agreed with that of *Nicodemus et al. (2002)* who mentioned that the receptivity of does to the male was lower at mating in first day than those mated within 7 days after parturition.

The age of buck, mating system and re-mating intervals had no significant difference in the gestation period. But, the litter size (number of kits) found to be affected by the age of buck as; the lowest litter size (3.4 kits) was obtained from the does mated with buck of an average age 4 months compared with those mated by bucks of an average age 6 months(6.2kits) and 8 months (7 kits) as shown in table 1 . These results were substantiated with that of *Miros and Tots (1974).* Also, there was a significant difference in the litter size among the does mated with

different number of services as; the litter size was higher in does mated by two services from different two bucks (7 kits) than those mated by two service from the same buck (6 kits) or one service (5 kits) as shown in table 2 . These results were coincided with that of *Nelson et al. (1979) and Toson et al. (1995)* and contrast with the results of *Kadry and Afifi (1983)* who recorded that the buck performance and number of services had no significant effect on the litter size at birth. These difference may be attributed to the difference in breeds, environmental factors (climate, nutrition) and methods of management applied. Moreover, the re-mating intervals had a clear effect on the litter size as; the highest litter size (7 kits) was obtained from does re-mated after 10 and 15 days post-partum and the lowest one (5 kits) was recorded for does re-mated one and five days post-partum (Table 3). These results were agreed with that of *Lamb et al. (1991)* who stated that the ovulation rate was lower in doe rabbits mated one day post partum than in those mated 14 days post-partum and the lower ovulation rate in early lactation was apparently caused by a reduction in ovarian competence to respond to the gonadotropic stimulus.

Litter weights at birth and weaning were higher for does mated by older bucks (8 months of age) than for those mated by bucks of an average age of 4 and 6 months (Table 1). These results were nearly the same with that obtained by *Miros and Tots (1974).* Moreover, the body weights at birth and weaning were higher for does mated by two services from one buck or two different bucks than for those mated by one service (Table 2). These results were nearly the same of that recorded by *Toson et al. (1995).* As well as, this trait was higher for does re-mated after 10 and 15 days post partum than for those re-mated after one and five days post-partum (Table 3). These results were coincided with that of *Mendez et al. (1986)* who attributed these variations to milk production as; the milk production was significantly lower in doe rabbits re-mated one day after parturition compared with those re-mated at 9 and 25 days post-partum.

The pre-weaning mortality percentages were higher for does mated by younger bucks of an average age four months (27%) than for those mated by Bucks of an average age of 6 and 8 months (20% and 15%, respectively) as shown in table 1. As well as, the pre-weaning mortality percentages affected by the number of services as; it was higher for does mated one service

(9%) than for those mated two services either from the same buck or different ones (16% and 15%, respectively) (Table 2) . While, the remating intervals played an important role in this trait as, the pre-weaning mortality percent was significantly lower for does re-mated at an intervals 10 and 15 days post-partum (12%) than for those re-mated at an interval one and five days post-partum (25% and 20%, respectively) (Table 3) . These results were substantiated with that of *Lammers and Petersen (1989)* who mentioned that the doe rabbits which inseminated after 33 days post-partum had lower mortality rates among live born rabbits. It may be attributed to low milk production in does re-mated one day post-partum *(Mendez et al ., 1986)* .

From this study, we conclude that the productivity of rabbits can be improved by some managemental aspects especially under intensive productive program as; good selection of the suitable age of buck at first mating (not less than 6 months) , making double mating from different two bucks and the re-mating interval post parturition not less than 10 days.

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Table (1) : Effect of age of buck at first mating on some reproductive traits in New Zealand White rabbits (Mean ± SE).

Variables / Traits	Age of buck at first mating		
	4 months	6 months	8 months
Conception Rate (%)	75	100 0.036b	100 0.044 b
Gestation Period (days)	30 0.008 a	29.9 0.012 a	30 0.014 a
Litter size (No. of kits)	3.40 0.022 a	6.20 0.030 b	7.00 0.012c
Kit weight at birth (g)	45 0.021 a	55 0.030 b	60 0.009 c
Kit weight at weaning (g)	410 0.048 a	460 0.036 b	500 0.014 c
Pre weaning mortality %	27 0.052 a	20 0.014 b	15 0.033 c

• **Means which scripted with different small letters (a, b, c...) at the same row differ significantly at (P< 0.05) .**

Table (2) : Effect of number of services on some reproductive traits in New Zealand White rabbits (Mean ± SE).

Variables / Traits	Number of services		
	One service	Two from one buck	Two from two bucks
Conception Rate (%)	75 ± 0.043 a	75 ± 0.029 a	100 ± 0.038 b
Gestation Period (days)	30 ± 0.006 a	30 ± 0.009 a	30 ± 0.007 a
Litter size (No. of kits)	5.00 ± 0.028 d	6.00 ± 0.014 b	7.00 ± 0.019 c
Kit weight at birth (g)	55 ± 0.036 b	65 ± 0.012 d	65 ± 0.018 d
Kit weight at weaning (g)	510 ± 0.012 d	515 ± 0.018 e	520 ± 0.013 f
Pre weaning mortality %	19 ± 0.012 d	16 ± 0.025 e	15 ± 0.031 c

* **Means which scripted with different small letters (a, b, c...) at the same row differ significantly at (P< 0.05) .**

Table (3) : Effect of post partum remating intervals on some reproductive traits in New Zealand White rabbits (Mean ± SE).

Variables / Traits	Post partum remating Intervals			
	1 day	5 days	10 days	15 days
Conception Rate (%)	75 0.026 a	50 0.011 c	100 0.030 b	100 0.024 b
Gestation Period (days)	30	30	30	30
Litter size (No. of kits)		5 0.025 d	7 0.018 c	7 0.020 c
Kit weight at birth (g)	55 0.034 b	60 0.011 c	65 0.019 d	65 0.016 d
Kit weight at weaning (g)	500 0.019 c	510 0.016 d	520 0.011 f	520 0.015 f
Pre weaning mortality %	25 0.032 f	20 0.011 b	12 0.038 g	12 0.034 g

* **Means which scripted with different small letters (a, b, c...) at the same row differ significantly at ($P < 0.05$) .**

الملخص العربى

العلاقة بين رعاية الأرانب النيوزلاندى و إنتاجيتها

طارق محمود موسى بلابل

قسم الصحة و الطب الوقائى ــ كلية الطب البيطرى ــ جامعة طنطا ــ مصر

أجريت هذه الدراسة على مزرعة خاصة للأرانب بمحافظة المنوفية ــ مصر ، بدأت الدراسة من أول سبتمبر 2002 و حتى مايو 2003 . و فيها تم اختيار عدد أربعين من أمهات الأرانب النيوزلاندى البيضاء متوسط أعمارهم تسعة شهور وعدد ثلاثة ذكور ذات أعمار مختلفة (أربعة ــ ستة و ثمانية شهور) و قسمت هذه الأرانب إلى ثلاث مجموعات . المجموعة الأولى اشتملت على عدد اثنا عشر من الأمهات و تم تقسيمها داخليا إلى ثلاث

مجموعـــات صغيرة متساوية لدراسة تأثير عدد مرات التلقيح على إنتاجيتها و المجموعة الثانية احـــتوت أيضا على عدد اثنا عشر من الأمهات بالإضافة إلى الثلاث ذكور و تم تقسيمهم داخليا إلى ثلاث مجموعات صغيرة (كل واحدة تحتوى على 4 أمهات + ذكر) و ذلك لدراسة تأثير عمر الذكور عند أول تلقيح على الإنتاجية . أما المجموعة الثالثة فاشتملت على عدد ستة عشر مـــن الأمهـــات و قسمت داخليا إلى أربع مجموعات صغيرة متساوية لدراسة تأثير فترة التلقيح بعـــد الولادة (يوم ــ خمسة أيام ــ عشرة أيام و خمسة عشر يوما) على إنتاجيتها وأظهرت النتائج التالية :ــ

1ــ كان معدل الخصوبة فى الأمهات و عدد الأرانب المولودة فى البطن الواحدة و كذلك أوزان الأرانب الصغيرة عند الولادة و الفطام للأمهات التى تم تلقيحها من ذكور ذات أعمار ستة شهور أو أكثر وأيضا التى لقحت مرتين من ذكر واحد أو ذكرين مختلفين و كذلك التى تم تلقيحها بعد الولاة بعشرة أو خمسة عشر يوما أعلى عن مثيلاتها التى تم تلقيحها من ذكور ذات أعمار أقل من ستة شهور و أيضا التى لقحت مرة واحدة بعد الولادة بيوم أو خمسة أيام .

2ــ لم تظهر أى فروق معنوية فى فترة الحمل باستخدام ذكور ذات أعمار مختلفة و كذلك عدد مرات تلقيح مختلفة بعد الولادة بفترات مختلفة

3ــ قلـــت نسبة نفوق الأرانب الصغيرة من بعد الولادة و حتى سن الفطام باستخدام ذكور ذات أعمـــار ســـتة شـــهور أو أكثر و عدد مرات تلقيح مرتين من ذكر واحد أو ذكرين مختلفين و أيضا عندما تم التلقيح بعد الولادة بفترة عشرة إلى خمسة عشر يوما .

مـــن هـــذه الدراسة نستنتج أنه يمكن تحسين إنتاجية الأرانب و خصوصا تحت نظام التربـــية المكثف باستخدام ذكور ذات أعمار ستة شهور أو أكثر و عدد مرات تلقيح مرتين من ذكر واحد أو ذكرين مختلفين و كذلك بترك فترة عشرة أو خمسة عشر يوما بعد الولادة.

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