

## EFFECT OF DOE-LITTER SEPARATION ON SURVIVAL AND GROWTH OF YOUNG RABBITS\*

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**ABSTRACT :** The effect of doe-litter separation on growth and mortality of young rabbits was studied at two different ages: 4 or 11 days. A total of 325 litters were used in this work. Experimental groups were composed with litters separated from their dam for 0, 24, 36 or 48 hours before the artificial insemination, performed on day 4 or 11 *post partum*. The separation lasting 36 or 48 hours clearly affected growth especially in 4 days old rabbits. A decrease of rabbit weight was observed after 48 hours separation on 4 days (20%,  $P < 0.001$ ) as well as on 11 days

(13%,  $P < 0.07$ ). The negative effect on growth was still detected at weaning (10-13%,  $P < 0.08$ ) in the 4 day-old rabbit group, but not in the 11 day-old group. Differences tended to disappear as age from weaning increased. Litter survival was not affected, although specific attention should be paid in future research at higher. It is concluded that the positive effects of doe-litter separation on fertility could compensate the negative influence on growth, which seem to be reduced as age from weaning increased.

**RESUME :** Effet sur la survie et la croissance des lapereaux, de la séparation mère-portée.

L'effet sur la croissance et la mortalité des lapereaux, de la séparation mère-portée, a été étudié à deux âges différents (4 et 11 jours) sur 325 portées. Les groupes expérimentaux sont constitués des portées séparées de leur mères pour 0, 24, 36, ou 48 heures avant l'insémination artificielle, pratiquée 4 ou 11 jours *post partum*. Les séparations de 24 heures et 36 heures affectent nettement la croissance des lapereaux surtout ceux âgés de 4 jours. On a noté une diminution du poids des lapins après 48 heures de séparation sur 4

jours de 20% ( $P < 0.001$ ) et de 13% ( $P < 0.07$ ) sur 11 jours. L'effet négatif sur la croissance se retrouve au sevrage (10-13% ;  $P < 0.08$ ) pour le groupe des lapins de 4 jours, mais pas dans le groupe des lapins de 11 jours. Plus on s'éloigne de l'âge du sevrage plus les différences tendent à disparaître. Elles ne seront sans doute plus détectables au moment de l'abattage. La survie de la portée ne semble pas être affectée mais ceci devra être revu au cours de futures expérimentations à plus grande échelle. On peut conclure que les effets positifs de la séparation mère-portée compensent les effets négatifs sur la croissance, qui semblent s'estomper après le sevrage.

### INTRODUCTION

Recently, rabbit reproduction research has focused on methods of ovarian stimulation as an alternative to the traditional PMSG treatment, currently employed in commercial rabbit farms (ANGELI *et al.*, 1990; COLIN, 1992; ALVARIÑO and REBOLLAR, 1995; REBOLLAR *et al.*, 1995). The administration of prostaglandins has been considered (FACCHIN *et al.*, ALVARIÑO *et al.*, 1995; PIMENTA *et al.*, 1996) as well as the so-called biostimulation techniques, including flushing, change of cage and doe-litter separation (LUZI and CRIMELLA, 1998; MAERTENS, 1998; THEAU-CLEMENT *et al.*, 1998; THEAU-CLEMENT and BOITI, 1998). Separation of does from their litters for short periods of time before artificial insemination (A.I.) seems to improve fertility but negatively affects the weaning weight of young rabbits (PAVOIS *et al.*, 1994; ALVARIÑO *et al.*, 1998). No effect on reproductive performance was observed when separation for 24 hours was applied 3 days before A.I. (CASTELLINI *et al.*, 1998). Periods of 36 or 48 hours seem to be more effective than 24 hours, although weight gain of litter clearly slows down (ALVARIÑO *et al.*, 1998).

The aim of this work was to quantify the incidence of doe-litter separation on mortality and growth of young rabbits when separation (from 0 to 48 hours) precedes to A.I. on days 4 or 11 *postpartum*.

### MATERIAL AND METHODS

A total of 325 litters were used in this work. The experimental design considered experimental groups separated from their dams by a metallic screen for 0, 24, 36 or 48 hours before insemination. When separation was carried out, kits were allowed to suckle previously to insemination. Before and after separation, females had free access to the nestbox. The experiment was performed on litters of two different ages, before day 4 or day 11 *postpartum*, which means that kits were 2 to 4 or 9 to 11 days old when separation from their dams started.

In all litters, the number of kits was recorded two days before A.I., as well as on day 25 after A.I.. Half of the litters (155) were weighted the day of A.I. after suckling, as well as the day 25 after A.I. which corresponds to an age of 28 or 35 days for the 4 or 11 *postpartum* groups, respectively.

Multiparous females of the Californian x NZW breed, housed in individual cages under controlled light/dark cycles (16h/8h) and fed *ad libitum* with a commercial pelleted diet, were used in this study.

According to the experimental design, females were inseminated on day 4 or 11 *postpartum*, about 10 minutes after removing the metallic screen. In all cases females which had been separated from their litters established contact with kits and allowed them to suckle. In this work, artificial insemination was performed 48 hours after ovarian stimulation by 20 IU of PMSG.

\*This work was a part of the «Co-ordinated joint research project of the IRREG» Data were partially presented at the 3<sup>th</sup> IRRG Meeting. «Rabbit reproduction research and practical application». Athens, 6-7 November, 1998

**Table 1.- Effect of litter separation on day 4 post partum on young growth and survival**

	Hours of doe-litter separation before A.I.			
	0	24	36	48
Initial weight (g) (1)	88.1 ± 2.5 A	79.6 ± 2.9 B	70.9 ± 2.6 C	70.5 ± 3.1 C
Initial litter size	8.8 ± 0.1	8.4 ± 0.1	8.8 ± 0.1	8.5 ± 0.1
Number of dead rabbits (2)	1.41 ± 0.28	1.85 ± 0.32	1.68 ± 0.27	2.19 ± 0.37
Weaning weight (g)	519 ± 24 a	488 ± 22 ab	451 ± 23 b	467 ± 19 ab
Daily gain (g)	17.3 ± 0.9	16.3 ± 0.8	15.2 ± 0.8	15.9 ± 0.7

(1) after suckling, the day of AI (2) from day 2 to weaning (day 28 of age) A,B,C: P<0.001; a,b: P<0.08

**Table 2.- Effect of litter separation on day 11 post partum on young growth and survival**

	Hours of doe-litter separation before A.I.			
	0	24	36	48
Initial weight (g) (1)	179.9 ± 6.5 a	177.3 ± 6.8 <sup>a</sup>	168.9 ± 5.3 ab	156.9 ± 8.5 b
Initial litter size	8.5 ± 0.2	8.4 ± 0.2	8.0 ± 0.2	7.9 ± 0.2
Number of dead rabbits (2)	1.74 ± 0.39	1.18 ± 0.37	1.59 ± 0.39	1.54 ± 0.37
Weaning weight (g)	775 ± 22	783 ± 37	774 ± 26	744 ± 32
Daily gain (g)	23.8 ± 0.8	24.1 ± 1.4	24.2 ± 0.9	23.5 ± 1.0

(1) after suckling, the day of AI (2) from day 9 to weaning (day 35 of age) a,b: P<0.07

Statistics was performed using GLM procedures of the SAS program. Means were compared using the Duncan test (SAS/STAT, 1985).

## RESULTS

Tables 1 and 2 show the effect of different periods of separation carried out before the A.I. on days 4 or 11 postpartum, respectively, on individual growth and mortality of litters.

The first significant effect was observed on the weight measured the day of A.I., after suckling, at the age of 4 days. A significant decrease of about 17 g (20%; P<0.001) is associated to the fact that litter is not allowed to suckle for 36 or 48 hours. Even the separation lasting 24 hours negatively affected individual weight of rabbits, a loss of 9 g (9,6%) being detected. When suckling is avoided for 36 or 48 hours a decrease of weight of 13 or 10% (68 or 52 g) at the age of 28 days (normal weaning age when females are inseminated on day 4 postpartum) is observed (P<0.08).

A doe-litter separation for 48 hours at the age of 9 days reduced the initial weight by 23 g (13%; P<0.07) but led to a non-significant decrease in the 35-day weaning weight of 30 g (4%).

Number of dead kits was not affected by the time of insemination.

## DISCUSSION

The doe-litter separation of up to 48 hours affected greatly the individual weight at the moment of A.I., at the age of 4 days (P<0.001) whereas the weight decrease was

relatively less and could be considered as just a tendency at the age of 11 days (P<0.07).

Growth rate between AI of the doe and kits weaning was not significantly affected by doe-litter separation. It can be only emphasised that during this time growth rate of the youngest rabbits was lower than that of the oldest.

As a consequence, a reduction in live weight was also detected at weaning, when separation was performed at the age of 2 to 4 although significance was low (P<0.08). In contrast, doe-litter separation at the age of 9 to 11 days failed to induce a significant difference in weaning weight, differently than observed in a previous work (ALVARIÑO *et al.*, 1998). Nevertheless we should remark that weaning age is not the same in the 2 works; weaning weight at 32 days of age was reduced by 70 g, (P<0.01) while in the previous work it was non-significantly reduced by only 30 g (NS) at 35 days exclusively for kits separated 48 h from their dam. In the present work, the negative effect of separation on growth may diminish with age but some parameters other than the weaning age were different between the 2 experiments (PMSG treatment of the doe, smaller number of observations, year of observation)

The number of dead rabbits was not affected as a direct consequence of separation, although a non-significant increment in the 48 hours group of up to 2.19 dead rabbits in very young rabbits suggests the need of carefully examining this aspect in future research. In the 9 to 11 day-old rabbits, mortality did not seem to be a problem, thus confirming previous findings, although in this work values are slightly higher than usual (ALVARIÑO *et al.*, 1998), due to a intestinal disease which provoked diarrhoea.

In conclusion, doe-litter separation for 36 to 48 hours brought about a loss of weight of 20% or 13% at the ages of

2 or 9 days, respectively. Moreover, it affected the growth until weaning, although the differences tended to disappear as age from weaning increased (10-13% at 28 days, 4% at 35 days). The positive effects of doe-litter separation on fertility (ALVARIÑO *et al.*, 1998; PAVOIS *et al.*, 1994; MAERTENS, 1998) could compensate the negative influence on growth, which seem to be reduced as age increases. Consequently, a limited controlled suckling could offer an alternative method to PMSG treatment in commercial units. This could be of interest in the near future, as natural methods of control of reproduction will be accepted better than the hormonal ones. Nevertheless, it would be useful to confirm these results following a group of females through their entire reproductive lifetime, using exclusively 24 or 36 hours of doe-litter separation as bio-stimulation in order to evaluate the long term effect on total productivity.

Acknowledgements : This work has been supported by the MINER (Spain) through the ATYCA Project B 0239/97.

Received : April 6<sup>th</sup>, 1999.

Accepted : September 9<sup>th</sup>, 1999.

## REFERENCES

- ALVARIÑO J.M.R., REBOLLAR P.G., 1995. Control de la reproducción en cunicultura: tratamientos hormonales, *Boletín de Cunicultura*, 77, 43-46.
- ALVARIÑO J.M.R., REBOLLAR P.G., DEL ARCO J.A., TORRES T., 1995. Estimulación ovárica en la coneja mediante una prostaglandina F<sub>2α</sub> y PMSG. *Ing. Tec. Eco. Agr. Vol. Extra*, 16, 461-463.
- ALVARIÑO J.M.R., DEL ARCO J.A., BUENO A. 1998. Effect of doe-litter separation on reproductive performance of lactating rabbit females inseminated on day 4 or 11 post partum. *World Rabbit Sci.*, Vol 6 (1), 191-194.
- ANGELI P., PASCOLO S., PECILE M., 1990. Fecondazione artificiale, una esperienza concreta. *Riv. Coniglic.*, 9, 31-36.
- CASTELLINI C., CANALI., BOITI C. 1998. Effect of doe-litter separation for 24 hours-closing the nestbox and change of cage on rabbit doe performance. *World Rabbit Sci.*, Vol 6, 199-203.
- COLIN M., 1992. Cycles synchronisation in rabbit production. *J. Appl. Rabbit Res.*, 15, 398-406.
- FACCHIN E., CASTELLINI C., RASETTI G., BALLABIO R., 1992. L'impiego di prostaglandina sintetica (alfaprostol) e di PMSG nella sincronizzazione degli estri e dei parti nella coniglia. *Riv. Zoot. Vet.* 20, 9, 2, 11-14.
- LUZI F., CRIMELLA C. 1998. Effect of change of cage on reproductive performance of rabbit does. *World Rabbit Sci.*, Vol. 6, 195-198.
- MAERTENS L. 1998. Effect of flushing, doe-litter separation and PMSG on the fertility of lactating does and the performance of their litter. *World Rabbit Sci.*, Vol.6, 185-190.
- PAVOIS V., LE NAOUR J., DUCEP O., PERRIN G., DUPERRAY J., 1994. Une méthode naturelle pour améliorer la réceptivité et la fertilité des lapines allaitantes en insémination artificielle. *6èmes Journées de la Recherche Cunicole. La Rochelle*, Vol. II, 528-535.
- PIMENTA A., REBOLLAR P.G., ALVARIÑO J.M.R., ALONSO R., 1996. Induction of rabbit parturition by administration of natural prostaglandin F<sub>2α</sub>. In : Proc. 6<sup>th</sup> World Rabbit Congress. Toulouse 1996, Vol. 2, 107-110.
- REBOLLAR P.G., ALVARIÑO J.M.R., PIMENTA A., ALONSO R., 1995. Empleo sistemático de PMSG como sincronizador de celo en un conejar comercial. *Inf. Tec. Eco. Agr.*, Vol. Extra, 16, 458-460.
- SAS (1995). SAS/STAT®. Guide for personal computers. Version 6, Edition Cary, NC, USA, SAS Institute Inc. 1.028 pp.
- THEAU-CLEMENT M., CASTELLINI C., MAERTENS L., BOITI C. 1998. Biostimulations applied to rabbit reproduction: theory and practice. *World Rabbit Sci.*, Vol. 6, 179- 184.
- THEAU-CLEMENT M., BOITI C. 1998. «Biostimulations methods» for breeding rabbit does: synthesis of the first result. *World Rabbit Sci.*, Vol 6, 205-207.