

EFFECT OF A 24 HOUR DOE-LITTER SEPARATION ON RABBIT DOE REPRODUCTIVE PERFORMANCE AND GROWTH OF THE YOUNG *

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ABSTRACT: The aim of this work was to study the effect of a 24h doe-litter separation (nest-boxes closed) on reproductive performance of rabbit does and growth of their young, in comparison with a control group (nest-boxes always opened). Two series of artificial insemination (A.I.) were studied (123 A.I.). Separated does were more fertile (94,9 vs 82,3 %, $P = 0.003$). Litter size at birth and at weaning, as well as litter

weight at weaning were not influenced by the biostimulation. At weaning, the mean weight of young rabbits from the experimental does was lower (559 vs 593 g, $P = 0.002$). Nevertheless, a 24h doe-litter separation on the tenth day of lactation just before insemination improved the productivity of does (+ 19,5 %).

RESUME. Influence d'une séparation mère-jeunes pendant les 24 heures précédant l'insémination, sur les performances de reproduction des lapines et la croissance des lapereaux. L'objectif de cette expérience était d'étudier en comparaison avec un lot témoin (allaitement libre), l'influence d'une séparation mère-jeunes 24 heures avant l'insémination (fermeture ponctuelle des boîtes à nid), sur les performances de reproduction des lapines et la croissance des lapereaux. Deux séries d'insémination ont été réalisées et 123 I.A ont

été analysées. Les lapines du lot expérimental ont été plus fertiles (94,9 vs 82,3 %, $P = 0,003$). Les tailles de portée à la naissance et au sevrage, le poids total de portée au sevrage n'ont pas été influencés par la méthode utilisée pour stimuler les lapines. En revanche, le poids moyen des lapereaux au sevrage du lot expérimental a été réduit (559 vs 593 g, $P = 0,002$). Cependant, la séparation mère-jeunes 24 heures avant l'insémination, a permis d'améliorer la productivité des lapines au stade 11 jours de lactation de 19,5 %.

INTRODUCTION

One of the aims of the International Rabbit Reproduction Group (IRRG) is to study "biostimulation methods" (an alternative to the use of hormones) to improve sexual receptivity of lactating does and consequently their productivity on rabbit farms (BOITI, 1998, THEAU-CLÉMENT *et al.* 1998). A short doe-litter separation would be easy to apply and inexpensive, but its effect on the improvement of reproductive performance has been disputed. PAVOIS *et al.* (1994) showed that a 24h doe-litter separation on the tenth day of lactation, immediately followed by suckling and insemination, improved the sexual receptivity rate (+ 25.6%) and the fertility (+ 13.4%). ALVARIÑO *et al.* (1998) did not confirm this improvement and found that a minimum of 36h was necessary to improve fertility (+10.5%). CASTELLINI *et al.* (1998) did not obtain any effect on reproductive performance when lactating does were separated from their litters for 24h, 3 days before insemination.

This work was a preliminary experiment to test the value of such a "biostimulation method". We studied sexual receptivity, fertility and productivity of does inseminated at the eleventh day of lactation, whose nestbox access was prevented 24h before insemination, in comparison with a control group (nestboxes always open). The effects on the growth of the young was studied until weaning.

MATERIAL AND METHODS

Animals.

Eighty A1077 multiparous does and twenty 2066 bucks were used.

Breeding system.

A 42-day reproduction rhythm was used, we considered in the text that does were inseminated 11 days *post partum*. Two batches of does were inseminated 21 days apart. Non-pregnant does at palpation (day 12) were inseminated again 21 days later. It was planned to standardise litters to 9 young (after eliminating runts) with adoptions within treatment. No hormonal stimulation was applied except GnRH to induce ovulation. Animals were housed in individual flat-deck cages under controlled light/dark cycles (16h/8h) and fed *ad libitum* with a commercial pelleted diet.

Group establishment

At the first insemination, two identical groups were formed, taking into account the physiological status (lactating, non lactating) and the parity of the does at the time of insemination. Each doe was definitively assigned to a treatment.

Experimental protocol

In the experimental group, does at the tenth day of lactation were separated from their litter 24h before insemination (by closing the nest-boxes at 10 a.m.). The next day, at 10 a.m, the nest-boxes were opened for controlled suckling. This was immediately followed by the sexual receptivity test (presentation to a buck) and

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Table 1 : Effect of a 24h doe-litter separation on the reproductive performance of lactating does

	Number of A.I.	Receptivity (%)	Fertility (%)	Born alive	Still born	Adjusted	Weaned	Litter weight at weaning (g)	Mean weaning weight (g)
Group*		NS	*	NS	NS	NS	NS	NS	**
24h separation	61	60.7 (6.4)	94.9 (4.0)	10.1 (0.5)	0.5 (0.2)	9.0 (0.2)	8.6 (0.1)	4829 (74)	559 (7)
Control	62	53.2 (6.3)	82.3 (4.0)	9.3 (0.5)	0.6 (0.2)	8.5 (0.2)	8.4 (0.1)	4969 (81)	593 (8)

insemination. In the control group, allowed free suckling, sexual receptivity was tested immediately before insemination. Inseminations were alternated between lactating does of the experimental group and the control group.

Inseminations

Semen was collected between 08:30 and 09:30 using IMV equipment (L'Aigle, France). Immediately after collection, each sample was evaluated by microscopic observation. Ejaculates were selected if their volume was greater than 0.4 ml and motility greater than 5 (PETITJEAN, 1965). Selected semen samples were pooled and diluted (1:5) with Galap (IMV diluent). Immediately after insemination, 0.2 ml of Receptal (HOECHST ROUSSEL VET, Romainville, France) was injected (i.m.) to induce ovulation.

Parameters studied

The receptivity rate, fertility (percentage of does kindling), litter size and litter weight at birth, after adoption, at insemination (after controlled suckling for the "separated" group), at 21 days, and at 28 days (weaning), were studied.

Statistical analysis

Receptivity and fertility were considered to be Bernoulli variables (range 0-1). Analysis of variance took into account the fixed effect of the treatment (2 levels : 24h doe-litter separation; free suckling) and insemination series (2 levels). In a preliminary analysis we found that the treatment did not interact with the insemination series. Viability was analysed using a chi-square test. Results presented in table 1 are least square means with standard deviations in brackets. The calculated probability (P) is indicated "NS" when $P > 0.05$, * when $P < 0.05$, ** when $P < 0.01$ and *** when $P < 0.001$.

RESULTS

In this analysis, we consider 123 inseminations made on multiparous does at the eleventh day of lactation. This trial was carried out in two series of artificial inseminations. Table 1 presents the reproductive performance of lactating does and growth of the young according to the treatment. The insemination series affected neither the reproductive performance of the does nor the growth of the young so the results were combined for analysis.

Receptivity

The sexual receptivity of "24h litter separated" does was higher than that of the control group (60.7 vs 53.2 % respectively), but the difference was not significant.

Fertility

A 24h doe-litter separation significantly increased the fertility of does compared with the control group (94.9 vs 82.3 % respectively, $P=0.028$).

Litter size

Litter size at birth was not significantly affected by the doe-litter separation. Nevertheless, the mean number of kits born alive was higher for the biostimulated does compared with the control group (10.1 vs 9.3 respectively). This illustrates the difficulty of standardising the control group to 9 young. Because of smaller than expected litters for the control group, it was only possible to have 8.5 young per litter.

Litter size at weaning was not affected by the biostimulation.

Mortalities at birth and from birth to weaning were lower for the biostimulated group compared with the controls (4.7 vs 5.8, $\chi^2 = 0.7$; 4.0 vs 6.7, $\chi^2 = 3.5$, respectively), but the differences were not significant.

Young rabbit growth

After litter size adjustment, the birth weight of the young rabbits did not vary between groups (Figure 1, 60.6 and 60.3g for the biostimulated group and the control group respectively). Compared with the control group, the weight of young rabbits born from the biostimulated does was lower at the time of insemination (just after a 24h separation, 190 vs 202g, $P=0.003$), at 21 days (325 vs 359g, $P=0.0001$), and at 28 days (559 vs 593g, $P=0.0016$). This result was confirmed when the number of adjusted young (fewer in the control group) was included as a covariate in the statistical model. Consequently, the daily gain of young rabbits was lower when they were submitted to a short separation from their mother when 10 days old (Figure 2). Nevertheless, from 22 days *post partum* to weaning, the daily gain of the biostimulated group increased until reaching that of the control group. If we take the weight of weaned rabbits produced per insemination as an overall productivity index, in comparison with the control group, the biostimulation improved the productivity of 11 day lactating does (at the moment of insemination) by +19.5 %.

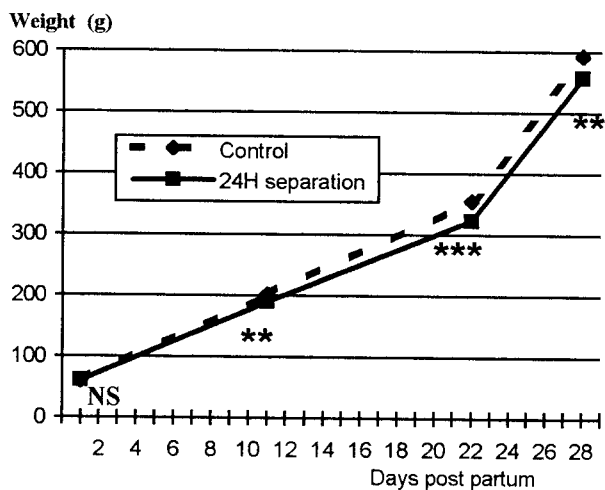


Figure 1 : Weight of young before weaning

DISCUSSION

As found by PAVOIS *et al.* (1994) but not by ALVARIÑO *et al.* (1998), a 24h doe-litter separation just before insemination improved the fertility of does inseminated at the eleventh day of lactation. We have not found any explanation for this difference: the physiological status of does was the same and the period between controlled suckling and insemination was always less than 10 minutes. Nevertheless, one source of variation is the genotype of the does.

As these previous authors concluded, such a biostimulation method does not affect prolificacy of lactating does.

From 11 days *post partum* to weaning, young rabbits separated for 24 hours from their mothers grew more slowly. Compared with a control group, ALVARIÑO *et al.* (1998) also found this, but the difference was not significant when the animals were weighed on day 9 and day 32. In this experiment, we show clearly that from 22 days *post partum* the daily gain of the experimental group recovered and exceeded that of the control group (39.4 vs 39.2 g). This observation creates an expectation of compensatory growth during the fattening period. In two experiments, Castellini *et al.* (1998) using a 24h doe-litter separation three days before insemination, e.g. when the young rabbits were only 8 days old, failed to show a decrease in individual weaning weight. This suggests a differential sensitivity in relation to age and/or other unknown factors.

Several hypotheses can be suggested to explain how a 24h doe-litter separation can reduce the growth of the young until weaning. Delayed suckling, when the young are 10 days old, could weaken them and consequently affect their growth and/or their mother's later milk production (quantitative and qualitative aspects).

CONCLUSION

This experiment showed that a 24h doe-litter separation at the tenth day of lactation can improve the fertility and consequently the productivity of does. Nevertheless, it should be repeated over a longer period with a greater number of does to

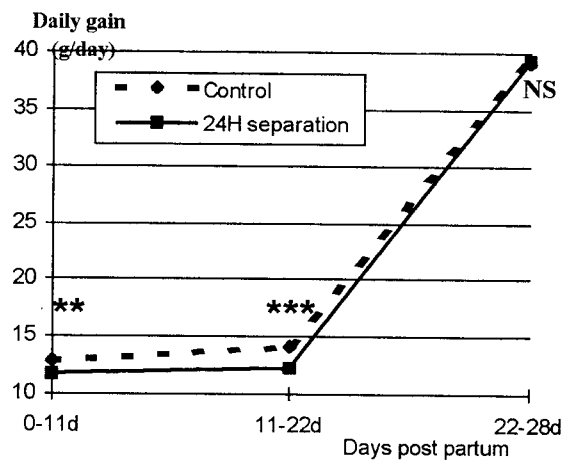


Figure 2 : Daily gain of young before weaning

confirm these effects for different parities, to test their sustainability, and to see whether there is a compensatory effect during the fattening period. These three points have to be verified before studying the underlying physiological mechanisms and recommending the application of such a biostimulation method on rabbit farms.

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