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# EFFECT OF THE ADOPTION SYSTEM ON RABBIT SURVIVAL RATE AND REPRODUCTION PERFORMANCE

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## INTRODUCTION

The actual interest in increasing rabbit farms productivity has brought about the utilization of selected animals for greater litter size at weaning. This along with the calving interval and the reproductive rythm used, they were the main actors which affected on productivity (Matheron, 1980).

These selection systems have produced an increase in litter size, in such a way that these were normally superior to the number of functional nipples each rabbit has. This has been determined as one of the causes of mortality during the period of lactancy in other species. It could also account for the mortality increase during the lactancy period on rabbits.

Usually, breeders try to correct this problem by equalizing each litter; taking young from more numerous litters and transfering them to smaller litters with the objective of obtaining greater viability. Despite this, no one adoption system has considered the number of mammary glands as adoption criterion in addition to young number.

Various authors have studied adoption systems, considering the number of young born and adopted (Roustan, 1980), the influence of the weight at birth on the viability (Lebas, 1983) the causes of mortality during this period (Okerman, 1983), and fertility and litter size (Matheron, 1980).

In the present study two adoption systems and a control were considered. Young survival, litter weight at weaning and average

individual weight were evaluated as well as the effect of the young born on reproductive performance related to the next parturition that has been mentioned previously by Garcia (1982), Plá (1984) and Pérez (1987, Personal Comunication).

## MATERIAL AND METHODS

The present study was carried out in the experimental farm of the Animal Science Department , of the UPV, using 150 non-nuliparas female rabbits from a line it was been selected for litter size at weaning and subjected to a semi-intensive system.

The animals were housed in a closed aisle, with controlled temperature and a light/dark cycle of 16/8 hours. Ad libitum commercial feed were offered.

Parturition occurred in a 2-3 days interval each week. At this moment young born from 4 to 8 litters were randomly assigned to each experimental group in accordance with the following code:

- Birth group (BG) : All litters were equalized to the week average litter size.
- Nipple group (NG) : Litter size were equalized to the functional nipple number of each female.
- Control group (CG) : No adoption was done.

The actual number, the adjusted number and the number of young weaned. as well as the average number of nipples per rabbit in each group are represented on Table I.

The statistical analysis were carried out using analysis of variance (ANOVA) with only one classification factor and variance - covariance analysis (ANCOVA) with the same classification factor. The programmes was run using the BMDP (Dixon et al, 1983) package

Table I.- Total number of parturitions, average litter size at birth, weaning and average nipple number.

| | CG | BG | NG | Total |
|---|---|---|---|---|
| Efectives number | 54 | 57 | 39 | 150 |
| Initial young born | 10.33 | 10.17 | 8.87 | 9.89 |
| Weaned young born | 8.75 | 9.07 | 7.82 | 8.63 |
| Nipples number | 8.94 | 8.61 | 8.81 | 8.80 |

The variables used were the following:
Survival rate (TS) : The percentage of young which began to suck and reached weaning alive.
Milk capacity (CL) : Weight of the litter at weaning (28 days).
Average weight at weaning (PMA): Average evaluation of young at weaning.
Attemps (INT) : The number of times that a female is presented to male in order to obtain a new pregnancy.
Services (SER) : The number of times a female accepts a male in order to obtain a new pregnancy.
The covariables used were:
Number of nipples (PEZ) : The number of nipples of each female.
Number of weaned young (DEST) : The number of young weaned at 28 days.

## RESULTS AND DISCUSSION

Results viability (%), milk capacity (CL) and average weight at weaning (PMA) are presented in Table II.

Table II.- Analysis of variance and covariance for survival rate (TS), milk capacity and average weaning weight.

| | Experimental group | | | | | Ancova | | |
|---|---|---|---|---|---|---|---|---|
| Variable | CG | BG | NG | Average | Signif. | Covariate | Regress coeff. | Sign. |
| TS % | 86,57 | 89,44 | 88,24 | 88,09 | NS | --- | --- | -- |
| | 86,62 | 89,36 | 88,26 | --- | NS | PEZ | -0,40536 | NS |
| CL | 4566,77 | 4561,29 | 3954,17 | 4405 | ** | --- | --- | -- |
| | 4545,00 | 4591,74 | 3939,83 | --- | ** | PEZ | +158,05976 | NS |
| | 4521,78 | 4405,21 | 4244,59 | --- | NS | DEST | +357,29769 | ** |
| PMD | 530,85 | 506,80 | 513,33 | 517,16 | NS | --- | --- | -- |
| | 533,46 | 515,87 | 496,46 | --- | NS | DEST | -20,74686 | ** |

NS - Non Significative ** ( P <= 0,01 )

The viability percentage did not present significative differences among the three stablished groups. High viability values in the three groups were observed in spite of the fact that average initial litter weight was high too (Table I). When the ANCOVA was carried out with the PEZ covariate, this presented a negative regression coeficient although it did not achieve significance levels neither did the classification factor. That would point out that the nipple number a female had in any of the three groups did not affect to the young born viability. Szendrö y Holdas (1984) in some of their lines has detected an adventageous effect of the female with more nipples on the viability of their young born during the lactation. It was in lines with smaller litters sizes at birth that they used in this paper, and no having practising adoptions.

In relation with the female milk capacity, significative differences between experimental groups were detected. In this case the regression coefficient of covariate PEZ was no significant. No significance of the nipple number on the milk capacity pointed out the independence between both two variables.

Carrying out the ANCOVA for the DEST covariable, the regression coeficient is positive and highly significative losing the classification factor his signification, that pointed out that the milk capacity came determinated by the weaned number and not by the adoption system.

In reference to the average weight at weaning no significative differences are detected between the groups when the ANOVA was carried out. When the ANCOVA for the DEST covariate was carried out, this was significative and presented a negative regression coeficient, without changing the signification of the factor, what seems to indicate that with a higher weaned number, less average weight at weaning of them, whatever it would be the female experimental group.

The effect that the assigned adoption system could make in the next litter obtaining, no having in the respective ANOVAS significative effect in the number of attemps and services to obtain the next litter (Table III).

Table III.- Analysis of variance for attemps and service

| | CG | BG | NG | Total | Sig. |
|---|---|---|---|---|---|
| Attemps | 1.63 | 1.36 | 1.53 | 1.50 | NS |
| Services | 1.24 | 1.24 | 1.28 | 1.25 | NS |

NS - Non Significative ** ( P <= 0.01 )

## CONCLUSIONS

1.- No significative differences in young survival rate between the adoption systems were noticed.

2.- The nipple number was not restrictive for the survival of the young.

3.- The milk capacity (expressed like weight at weaning of the litter) was not affected meaningly by the nipple number.

4.- The differences in the milk capacity detected between the diferent experimental groups established were explained by the differences existing in the number of weaned young between that levels.

5.- No significative differences were detected in the average weight at weaning in the different experimental groups when a constant number of weaned young was dessigned, although a higher number of weaned group determinated a PMD reduction despite adoption system considered.

6.- The attemps and services to obtain the next litter were not affected by the adoption system used.

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Two systems of adoption and a control have been compared in multiparous rabbits belonging to a line selected for litter size at weaning .The experimental groups were: a) 54 control females of which every rabbit suckled its litter until weaning; b) 57 females the total number of young were divided equally between the number of rabbits which had given birth; c) 39 females in which only the number of young corresponding to number of teats each rabbit bore were left. The survival rate, the litter weight and the average weight of young at weaning have been evaluated as well as the effect of the adoption system on the subsequent reproductive performance. The adoption system utilized does not significantly affect the rate of survival as long as the number of nipples does not limit the said survival rate independent of the stated adoption system. The significant differences in litter weight detected between the different adoption systems are explained by the existing differences in the number weaned within the different systems. The average weight of young at weaning is not affected by the adoption system, nor have significant differences been observed with respect to the reproductive performance on the subsequent litter.

## EFECTO DEL SISTEMA DE ADOPCION EN LA SUPERVIVENCIA Y EL COMPORTAMIENTO REPRODUCTIVO DE LA CONEJA

Se compararon dos sistemas de adopción en conejas multíparas de una línea de selecciónpor tamaño de camada al destete. Los grupos experimentales fueron: a) 54 hembras testigo en las cuales cada coneja mantiene su camada hasta el destete; b) 57 hembras en las cuales se repartieron los gazapos nacidos en cada paridera entre el total de conejas paridas; c) 39 hembras en las cuales se dejaron exclusivamente los gazapos correspondientes al número de pezones que cada coneja presentara. Se ha evaluado la tasa de supervivencia, el peso de la camada y el peso medio al destete de los gazapos, así como el efecto del sistema de adopción sobre las presentaciones y servicios requeridos para obtener la siguiente camada. El sistema de adopción utilizado no afecta significativamente a la tasa de supervivencia, no siendo el número de pezones limitante para dicha supervivencia con independencia del sistema de adopción. Las diferencias significativas en el peso de la camada detectadas entre los distintos sistemas de adopción son explicados por las diferencias existentes en el número de destetados entre dichos sistemas. El peso medio al destete de los gazapos no es afectado por el sistema de adopción. Tampoco se observan diferencias significativas en las presentaciones y servicios requeridos para obtener las siguiente camada.