

EFFECT OF SEXUAL RECEPTIVITY ON OVULATION RESPONSE IN RABBIT DOES INDUCED WITH GnRH

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Introduction

The artificial insemination (A.I.) in rabbits presents difficulties when applied in lactating does (RODRIGUEZ J.M. et al, 1983; SINKOVICS et al, 1983; BECHS-TEDT U HATTEN H, 1984). Ovulation usually is induced by administration of GnRH, obtaining good performance in nulliparous but not in multiparous females. The response improves when considering only does with sexual receptivity to the male, which indicates that the negative influence of lactation over the A.I. results is due to the higher ratio of non receptive does (ROUSTAN A., 1982).

A relationship has been detected between the colour of the vulva and the efficacy of A.I. (BATTAGLINI M. et al, 1982; ROCA T. et al, 1896), failure in does with pale vulva is well-known. The vulva is closely related with does rejecting the mounting (DELAVEAU A. 1978; GOSALVEZ L.F., 1986), which agrees with the negative influence of low sexual receptivity on the efficacy of the A.I.

The aim of this trial was to study the influence of sexual receptivity on the ovulation response, and try to improve the results with administration GnRH in lactating does.

Materials and methods

Fifty four female rabbits of the California breed were used in this study. They were housed in individual cages, with controlled light/dark cycles (16:8). They were fed and watered ad libitum and distributed in two groups (nulliparous or lactating does). Each female was assigned to a high or low sexual receptivity level (HSR or LSR). The classification of does into HSR or LSR was made according to previous data (GOSALVEZ L.F., 1986), using the colour and turgency of the vulva as a predictor of sexual behavior. Does with pale or violet non turgent

vulva were assigned to LSR and does with red, rose and violet turgent vulva— were assigned to HSR. Both groups had different probabilities of mounting acceptance (74 % vs 24 % ;  $p < 0.001$ ).

Ovulation was induced by a synthetic analogue of GnRH (Fertagyl, Intervet) administered in doses of 20 or 40  $\mu$ g, (i.m.) in the nulliparous or lactating does, respectively. The dose of 20  $\mu$ g showed good performance in previous works in— both HSR nulliparous and lactating does (RODRIGUEZ J.M. et al, 1986), being therefore considered as a reference point to check the response to a higher dose of GnRH (40  $\mu$ g) administered to lactating does.

The ovulation rate was determined by laparoscopy, in does previously anaesthetized with Pentothal (Abbot), counting the number of corpora lutea (c.l.) in both ovaries. The determination was made between the 9<sup>th</sup> and 14<sup>th</sup> day post injection.

Statistical analysis of the results was carried out using non-parametric tests— after verification by a Chi-squared test that these data did not approximate a— normal distribution. A Mann-Whitney test (SIEGEL S., 1956) was used for comparison of means and the modified Chi-squared test by Yates (YATES F., 1937) to compare proportions.

#### Results

The results are shown in table 1. GnRH induced ovulation in most of HSR does (91.4 %), while the result was poor in LSR does (57.9). The poorest performance corresponded to LSR does treated with 20  $\mu$ g (37.5 % ;  $p < 0.001$ ).

The mean number of c.l./ ovulating doe was higher in lactating than in nulliparous does ( $9.9 \pm 0.6$  vs  $8.1 \pm 0.6$  ;  $p < 0.01$ ). The same occurs when considering— the mean number of c.l./ treated doe ( $8.2 \pm 0.8$  vs  $6.12 \pm 0.8$  ;  $p < 0.01$ ). These effects are due to the differences between HRS does, without significant variations between LSR females.

The mean number of c.l./ treated doe was lower for the LSR compared to HSR does, ( $5.4 \pm 1.2$  vs  $8.3 \pm 0.6$  ;  $p < 0.05$ ) This result was found in both nulliparous and lactating does. Nevertheless, there was no significant difference when— considering only the ovulating LSR or HRS does ( $9.3 \pm 0.9$  vs  $9.0 \pm 0.5$ ), neither in nulliparous or lactating does.

Discussion

The results showed that the failure of induced ovulation is an important cause of poor performance obtained with A.I. in LSR does. These data agree with the better fertility found in receptive than in non receptive females after A.I. (ROUSTAN A., 1982). This means that the problem in the A.I. of lactating does is more related to the high rate of females rejecting mounting than with the lactation itself. Our results could explain the poor efficiency of A.I. obtained by other authors in lactating does (RODRIGUEZ J.M. et al, 1983; ROCAT, FANLO R., 1983). The positive influence of red and rose vulva colours and of the level of sexual activity on the ovulation response after coitus (LEYUN M., 1982; PLAM. et al, 1984), suggest that the mechanisms blocking the ovarian response may be the same as in A.I. Since the rabbit ovary presents preovulatory follicles in

Table 1.- Influence of the level of sexual receptivity, high (HSR) or low (LSR), and age, on the ovulation response to GnRH

	HSR			LSR		
	CL/TD	% OD	CL/OA	CL/TD	OD/TD	CL/OD
Nulliparous 20 GnRH	7'2 ± 0'8	94	7'6 ± 0'7	3'9 ± 1'9	37'5	10'3 ± 0'9
Lactating does 40 GnRH	9'3 ± 0'9	88'9	10'4 ± 0'6	6'5 ± 1'5	73	8'9 ± 1'2

\*\*\* p < 0'001 ; \*\* p < 0'01 ; \* p < 0'05  
 (Significance markers are placed between the two rows for comparisons: CL/TD HSR vs LSR (\*\*\*), CL/OA HSR vs LSR (\*\*), CL/TD LSR vs LSR (OD/TD) (\*), CL/TD LSR vs LSR (CL/OD) (\*).)

C.L./T.D.: corpora lutea/ treated doe (mean ± S D)

C.L./O.D.: corpora lutea/ ovulating doe (mean ± S D)

OD/TD: ratio ovulating does/treated does (%)

\*\*\* p < 0'001 ; \*\* p < 0'01 ; \* p < 0'05

all the postpartum period (days 1 to 11), (GOSALVEZ L.F., 1986), in non receptive does coitus or GnRH were probably not able to provoke preovulatory discharge of LH and FSH.

The difference found in the ovulation rate for nulliparous compared to lactating does must be attributed to the influence of age. The increase in 2'8 c.l./ ovulating HRS doe agrees with data of other authors in ovulations after mounting -- (GARCIA F. et al, 1984; HULOT F., MATHERON E., 1981).

The increase of the GnRH dose from 20 to 40  $\mu$ g overcomes partially the failure of ovulation in LSR does, which supports the hypothesis that there is an increased limited of pituitary gland sensibility reached by the 40 g but not by the 20  $\mu$ g dose. This may be conditioned by the level of plasma oestrogens produced by preovulatory ovarian follicles, whose number changes throughout the postpartum period acting on the sexual behavior of females (LEVASSEUR M.C., THIBAUT C., 1980). In fact the three ovulating females in the LSR 20  $\mu$ g group reached 9, 10 and 12 c.l. indicating that ovulation occurs when there is a high number of functionally preovulatory follicles. However new research is necessary to determine the optimum dose and administration time to obtain satisfactory results, similar to those of HSR does.

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SUMMARY

The effect of two doses of GnRH (20 or 40  $\mu$ g, i.m.) on the ovulation response of rabbit does with high or low sexual receptivity (S.R.), is studied. The ovulation rate of the 54 does was determined by laparoscopy, counting the number of corpus luteum (c.l.), between days 10 to 14 post injection.

The results indicate that GnRH induces ovulation in most of the high S.R. does, treated with 20  $\mu$ g (94%) or 40  $\mu$ g (89%). In the low S.R. does, the response to 20  $\mu$ g was lower (37.5% ;  $p < 0.001$ ). The mean number of c.l. per ovulating doe was higher for 40  $\mu$ g than 20  $\mu$ g in the group with high S.R. ( $10.4 \pm 0.6$  vs  $7.6 \pm 0.7$  ;  $p < 0.01$ ). The number of c.l. produced per doe was superior for the high S.R. compared to low S.R. does, either with 20  $\mu$ g ( $7.2 \pm 0.8$  vs  $3.9 \pm 1.9$  ;  $p < 0.05$ ) or 40  $\mu$ g ( $9.3 \pm 0.9$  vs  $6.5 \pm 1.5$  ;  $p < 0.05$ ). The authors consider that the increase of the GnRH dose from 20 to 40  $\mu$ g, overcomes partially the failure of ovulation in the low S.R. does, new research being necessary to determine the optimum dose and administration time to obtain satisfactory results in the artificial insemination of this type of animal.

RESUMEN

En este trabajo se ha estudiado la respuesta ovulatoria de 54 conejas de raza-- Californiana, distribuidas en dos niveles de receptividad sexual (N.R.S.), alto y bajo, y sometidas a tratamientos con GnRH, en dosis de 20 ó 40  $\mu$ g (i.m.).-- La tasa de ovulación ha sido determinada por laparoscopia, mediante conteo de-- cuerpos lúteos en el día 10 a 14 post inyección.

Los resultados obtenidos indican que el GnRH provoca la ovulación en la mayoría de las conejas con alto NRS, tratadas con 20  $\mu$ g (94%) o con 40  $\mu$ g (89%). En el caso del bajo NRS la respuesta a 20  $\mu$ g ha sido inferior (37.5% ;  $p < 0.001$ ). El nº medio de cuerpos lúteos por coneja ovulante ha sido superior para 40  $\mu$ g que para 20  $\mu$ g en el grupo de alto NRS ( $10.4 \pm 0.6$  vs  $7.6 \pm 0.7$  ;  $p < 0.01$ ). En el nº de cuerpos lúteos producidos por coneja ha resultado superior para el nivel alto de NRS -- frente al bajo, tanto con 20  $\mu$ g ( $7.2 \pm 0.8$  vs  $3.9 \pm 1.9$  ;  $p < 0.05$ ) como con 40  $\mu$ g de GnRH ( $9.3 \pm 0.9$  vs  $6.5 \pm 1.5$  ;  $p < 0.05$ ).

Los autores consideran que el aumento de la dosis de GnRH de 20 a 40  $\mu$ g supera parcialmente el fracaso de ovulación en el grupo de bajo NRS, siendo necesarios futuros trabajos para determinar la dosis y método de administración que -- permitan resultados satisfactorios en la inseminación artificial de este tipo de conejas.

