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Effect of HCG Injection on Poor Fertile Rabbits

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SUMMARY - Twenty-six low receptive does and 12 bucks with poor fertility of New Zealand White (NZW) breed, were used. The aim was to study the effect of injection of 50 I.U. human chorionic gonadotrophin (HCG; Pregnyl) on productive and reproductive performance of such rabbits.

The hormonally treated does were significantly ($P < 0.01$ or 0.05) higher than the control in response to coitus, conception rate, litter size at birth and bunny weight. However, no significant differences were detected in gestation length, litter weight, litter weight gain and pre-weaning mortality rate between the two experimental groups. Injection intramuscularly with 50 I.U. HCG to bucks with low semen quality increased ($P < 0.01$ or 0.05) the ejaculate volume, sperm motility and sperm concentration and decreased ($P < 0.05$) the dead and abnormal spermatozoa.

Key words: rabbit, fertility, conception rate, litter size and weight.

Introduction

Rabbit breeders are faced sometimes by infertile or low fertile does in their flocks. At the same time, presence of some bucks with low libido, poor sperm motility and low sperm concentration is a common phenomenon during some periods of the year. Sometimes such phenomenon in does and bucks become a major phenomenon.

The present investigation was carried out to study the effect of injection of rabbits with 50 I.U. HCG on the reproductive performance of low receptive NZW does. The effects of HCG injection on semen characteristics of poor fertility bucks, were also investigated.

Materials and Methods

The present study was conducted on a flock of NZW rabbits belonging to Saft Zoreek Co-operative farm, Sharkia

Governorate, Egypt, during the period from April to August, 1992.

Twenty six low receptive does showing low response to mating for a long time (coitus refused) or low conception rate during the previous breeding seasons, were carefully chosen from records. Anthor 12 bucks of NZW rabbits which had bad semen characteristics and poor fertility results during the previous seasons, were also used. The animals were housed in individual cages and fed ad libitum on pelleted ration containing 17.3% crude protein, 13.5% crude fibre and 3.2% fat. Fresh water was available at all times. All animals were kept under the same managerial hygienic and environmental conditions. The experimental animals were allotted in a windowed rabbitry provided with flat deck cages. Low receptive does (n=26) were divided into two equal experimental groups (n=13). The first group was injected intramuscularly with 50 I.U. HCG (Pregnyl, produced by Nile Company for Pharmaceuticals and Chemical Industries). The second group (control) was injected with saline solution (1ml of 0.9% NaCl). The does were then mated with 10 normal (fertile) bucks. Number of does copulated, number of pregnant does, conception rate, number of services per conception, gestation length, litter size, litter weight, bunny weight, litter weight gain and pre-weaning mortality percentage, were studied. The bucks of bad reproductivity were also divided into two experimental groups with equal numbers (n=6). One of the group was injected intramuscularly once weekly with 50 I.U. HCG (Prognyl). The second (control) was injected with saline solution. Semen samples were collected by using of an artificial vagina 6 days after HCG injection. Ejaculate volume, sperm motility, sperm concentration, dead spermatozoa and abnormal spermatozoa were determined according to El-Gaafary (1987).

Data of doe traits were statistically examined by Least Squares Maximum Likelihood method of analysis (Harvey, 1977). Conception rate was analyzed using the Contingency Tables according to Everitt (1977). Pre-weaning mortality percentages were subjected to arc-sine transformation before being analyzed in order to approximate normal scale distribution. Least square means were retransformed to the original scale before being illustrated. Data of semen characteristics were statistically analyzed according to Snedcor and Cochran (1982).

Results and Discussion

1. Effect of HCG injection on low receptive does:

Injection of does with HCG induced coitus in most does and 80% of the treated does were copulated, while the corresponding value in the control does was 63.5% (Table 1). The differences in number of copulated does between the control and injected groups were significant ($P < 0.05$). Khalifa *et al.* (1989) found similar trend with PMSG injection in low receptive NZW rabbits.

The mean conception rate was significantly ($P < 0.05$) higher in the injected group (70%) than in the control (54.5%) group (Table 1). The present results agreed with those obtained by Theau *et al.* (1990) who found that the ovulation rate and fertility in terms of conception rate were very high among receptive does and significantly low among non-receptive ones.

The differences in the number of services per conception were significantly ($P < 0.01$) lower in the injected group than in the control group (Table 1). Khalifa *et al.* (1989) found that mating acceptance rate was considerably higher in the female injected with PMSG (95.4%) than in those untreated (31.6%).

Gestation length was nearly similar in the injected with 50 I.U. HCG and the control group (Table 1). Similar trend was obtained by El-Gaafary *et al.* (1991).

Average litter size at birth was significantly higher ($P < 0.01$) in the HCG injected group than in the control group. However, at 21 and 28 days of age insignificant effects were detected (Table 1). Urbanski (1979) reported that the average litter size was significantly higher in does injected with 50 I.U. HCG than in the untreated group.

Averages of litter weight of low receptive NZW does at birth, 21 and 28 days of age were insignificantly heavier in the group injected with 50 I.U. HCG than in the control group (Table 1). Similar trend was observed by El-Gaafary *et al.* (1991) who noticed that the litter weight at weaning was improved as a result of HCG injection.

The differences in bunny weights at birth, 21 and 28 days of age between the two experimental groups were significant

Table 1. Effect of HCG injection on traits of low receptive NZW female rabbits.

Traits	Control	Injected	t-test
Number of does.	52	52	
Copulated does (number, %)[a]	33(63.6%)	40(80.0%)	6.3*
Number of pregnant does	18	28	
Conception rate (%)[a]	54.5	70.0	4.8*
Number of services per conception	2.39±0.24	13.6±0.14	4.38**
Gestation length (Days)	31.39±0.23	31.39±0.21	0.00
Litter size at:			
Birth	5.22±0.54	6.93±0.38	2.04*
21st day	4.39±0.49	5.46±0.41	1.27
28th day	4.33±0.47	5.29±0.38	1.21
Litter weight (g):			
Birth	285.11±26.90	341.57±17.02	0.81
21st day	1649.00±147.09	1731.43±108.16	0.35
28th day	2040.56±185.50	2251.07±134.87	0.72
Bunny weight (g) at:			
Birth	56.92±1.71	50.30±1.13	2.58**
21st day	395.31±16.46	329.25±11.59	2.31*
28th day	494.93±15.73	437.00±13.58	2.10*
Litter weight gain (g):			
Birth-21 days	1363.89±126.92	1387.46±97.76	0.11
Birth-28 days	1755.44±164.50	1909.50±124.17	0.58
Pre-weaning mortality (%):			
Stillbirths	0.57	0.50	0.01
Birth-21 days	6.91	15.52	0.15
Birth-28 days	7.96	18.12	0.17

a = conception rate was analysed by Chi-square.
** $P < 0.01$
* $P < 0.05$

($P < 0.01$ or 0.05); being lower in the HCG injected group (Table 1). This may be attributed to the high litter size recorded in the injected group. Afifi *et al.* (1973) agreed that the mean bunny weight at birth or at weaning decreased with the increase of litter size at birth.

Litter weight gain from birth to 21 days and from birth to 28 days of age were insignificantly heavier in the low receptive does injected with 50 I.U. HCG than in the control group (Table 1).

Average pre-weaning mortality rate was insignificantly higher in the injected than in the control group (Table 1).

2- Effect of HCG injection on physical semen characteristics of poor fertile bucks:

The present data in Table 2 showed that HCG injection increased significantly ($P < 0.05$) the ejaculate volume, sperm motility, normal spermatozoa and sperm concentration and insignificantly the wave motion and live spermatozoa over the control group. The influence of the HCG in the reproductive performance of the bucks is mediated through the activity of the adenohypophysis, stimulating the amount of LH and FSH released. The LH stimulates the interstitial cells (or Leydig cells) to secrete androgen (testosterone), while FSH stimulates the Sertoli cells to secrete Androgen-Binding Protein. The androgen and the Androgen-Binding Protein bind together to stimulate the development of the germinal cells. The androgen can also stimulate the libido of the bucks, maintains the balance of hormones in the body, and prolongs the life of the spermatozoa and promotes their motility. The present results were in agreement with those of El-Gaafary *et al.* (1991) who found a qualitative improvement in the semen produced by the bucks injected with 50 I.U. HCG. Hsu *et al.* (1987) also noticed an improvement in the semen quality following administration of gonadotrophin releasing hormone to low semen quality bucks.

In the light of these findings, it could be concluded that injection of rabbits with 50 I.U. HCG improved the reproductive and productive performance of low receptive does and poor fertile bucks. Utilization of HCG to improve the reproductive and productive performance of the low fertile rabbits may be recommended.

Table 2. Physical semen characteristics of low NZW buck groups treated with HCG.

Traits	Control	50 I.U.
Volume	$0.8^{b} \pm 0.05$	$1.0^{a} \pm 0.07$
Wave motion	$2.7^{a} \pm 0.14$	$3.00^{a} \pm 0.14$
Motility (%)	$49.50^{b} \pm 2.29$	$57.50^{a} \pm 1.62$
Dead (%)	$18.67^{a} \pm 0.87$	$17.42^{a} \pm 0.79$
Abnormalities (%)	$17.25^{a} \pm 1.10$	$13.46^{b} \pm 1.06$
Concentration (x 16^{6})/ml	$160.21^{b} \pm 5.02$	$199.79^{a} \pm 5.84$
Concentration (x 10^{6})/ ejaculate	$126.44^{b} \pm 8.48$	$192.46^{a} \pm 17.38$

Means in the same row within the same classification with different letters, differ significantly ($P < 0.05$).

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