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THE EFFECTS OF GnRH ON THE FERTILITY OF ANGORA RABBITS IN SUMMER

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SUMMARY- In this investigation, the effects of GnRH (Gonadotropin Releasing Hormone) on the fertility of Angora rabbits in summer were studied. In this study, 14 female and 3 male Angora rabbits aged between 2 to 3 years were used. The animals were kept in individual cages. All animals were fed with pelleted allmash feed ad libitum. Environment temperature varied between 20 to 35 °C in August. Female rabbits were divided into 2 groups having 7 rabbits in each group.

Before mating all rabbits were sheared. In each group, 3 male rabbits were used for natural insemination. All does were taken to the buck's cages every evening for mating. Buserelin-GnRH analogue (0.8 µg) was injected intramusculary by single injection just after the natural mating to group 1. Rabbits of the group 2 were served as controls. Parturition has not been observed in animals of the second group, but 57.1% pseudopregnancy was detected. In the first group, pseudopregnancy rates, parturition rates and average litter size were 42.8%, 28.5% and 4, respectively.

As a result, it was concluded that in summer time when fertility rates are so low, by the injection of one dose GnRH after natural mating to female Angora rabbits fertility rates was increased.

Key words: Angora rabbits, fertility, GnRH, summer.

RESUME- Les effets de GnRH (Gonadotropin Releasing Hormone) sur la fertilité des lapins Angora ont été étudiés pendant l'été. L'étude a été réalisée chez 14 femelles et 3 males agés entre 2 et 3 ans. Les animaux ont été gardés dans des cages individuelles et nourris avec des comprimées ad libitum. La température d'environnment a été variée entre 20-30 °C au mois d'Août. Les femelles ont été divisées en deux groupes contenant 7 animaux par groupe.

Avant les essais de copulation tous les animaux ont été tondus. Pour les deux groupes, 3 males ont été utilisés pour les accouplements. Pour cela, les femelles ont été transportées dans les cages des males pendant les soirées. Les femelles du premier groupe ont été injectées par voie intramusculaire du buserelin au dose de 0.8 µg suivant l'accouplement naturel. La deuxième groupe a été gardé comme groupe contrôle. On n'a pas retrouvé d'accouchment chez les femelles de la deuxième groupe mais la pseudo-grossesse a été 57.1%. Par contre, la pseudo-grossesse a été retrouvée dans 42.8% des cas et l'accouchment dans 28.5% des cas du premier groupe. La fécondité moyenne vis-à-vis des petits a été retrouvé au nombre de 4 dans le premier groupe.

On peut conclure de cette étude que, aux mois d'été où la fertilité des lapins Angora est minimale, il devient possible d'augmenter la fertilité avec me administration de GnRH chez ces animaux.

Mots-clés: Lapins Angora, fertilité, GnRH, été.

INTRODUCTION

Wild rabbits show a definite period of anestrus and experience seasonal variations in reproductive capacity. Among domestic rabbits, the duration of anestrus varies with colonies and individual rabbits. Some does and bucks are fertile throughout the year, but most exhibit anestrus for 1 to 2 months (Hafez, 1987). The breeding season is at a peak in the spring and early summer (Adams, 1972; Adams, 1976).

Unlike rodents and farm mammals, rabbits do not show regular estrus cycyles, although a certain rhythm exists in their sexual receptivity. If the doe is not bred, the follicles in the ovary remain large and active for 12 to 16 days. They begin to regress and new ones grow to replace them. Active follicles are consequently present at all times during the breeding season except perhaps in transitional periods, when the new set of follicles is growing and the old set is retrogressing. A doe may show no sexual receptivity when she is molting, lactating or poorly nourished because follicle development is suspended (Hafez, 1987).

Ovulation is generally non-spontaneous, requiring the stimulus of mating for its induction. In the rabbit, ovulation occurs 10 to 13 hours after copulation (Adams, 1976; Colby, 1986; Hafez, 1987).

A proportion of does, sometimes 25 percent or more, fail to ovulate after mating; this is probably due to a deficiency of luteinizing hormone (LH) in their pituitary gland. Ovulation failure is influenced by season, an important factor being the number of daylight hours; in the Northern hemisphere the late summer and autumn period is generally considered to be the most difficult and the spring the least so (Adams, 1976).

Ovulation can also be induced by the sight of a sexually active male, by mating with a vasectomized male, a female mouting another female, mechanical stimulation of the vagina and excessive handling by the owner (Adams, 1976; Colby, 1986; Hafez, 1987). Ovulation failure is probably the most important single cause of infertility in the rabbit (Adams, 1972; Adams, 1976).

Different hormones are used for induction of ovulation in rabbits. HCG or LH preparations have been used in the past, but repeated administration results in the formation of antibodies and a subsequent loss of activity. As has been demonstrated in laboratory experiments and field trials, this problem is`eliminated if gonodotrophin releasing hormone (GnRH) is used (Hoechst; Kraemer and Bowen, 1986).

The action of GnRH is enhanced by a high estrogen level. A high estrogen level manifests itself clinically as reddening of the vulva. During natural mating, where ovulation is induced by the act of coitus, the administration of releasing hormone can be expected to provide an additional follicle-stimulating and ovulation-inducing stimulus.

Investigations in rabbits have shown that the GnRH analogue buserelin possesses a considerably higher endocrine activity than natural GnRH (gonadorelin). It induces higher levels of LH and -particularly- FSH secretion with consequent stimulation of the gonadal hormone production. In rabbits, follicle maturation is intensified and the ovulation rate increased (Hoechst).

Unless ovum which is released after ovulation is fertilized, a pseudopregnancy which takes 15-17 days can be seen (Adams, 1976; Bekyürek, 1997; Hafez, 1987; Kraemer and Bowen, 1986).

The Angora rabbit is one of the oldest known breeds of domestic rabbit, and has in fact been kept for its wool for many hundreds of years. Although twelve different colours are recognised, the majority of Angoras bred are white. About 800-900 g of wool per rabbit per year is the average production of Angora rabbits. The wool is cut 4-6 times in a year directly above the skin surface using shears or electric clippers.

Low fertility is the biggest problem of Angora rabbits (less than 50%). The reproductive performance of Angora rabbits decreases because of thermal-regulatory problem which is related to their long fleece. Therefore, the decreasing of fertility is more prominent in summer than other times. However, the conception rate is the highest during the spring breeding season (Bekyürek, 1998; Schlolaut, 1988; Schlolaut, 1994). On the other hand, it was reported that after shearing of Angora rabbits, can increase the fertility rates (Schlolaut, 1994).

In this study, we searched the effect of GnRH injections used after natural mating of Angora rabbits in summers on fertility rates.

MATERIALS AND METHODS

In this study, 14 female and 3 male Angora rabbits aged between 2 to 3 years were used. The experiments were performed in Kayseri in August 1997. The animals were kept in individual cages and fed with pelleted allmash feed ad libitum. Environment temperature varied between 20 to 35 °C in August.

All the animals were sheared before experiments. Female rabbits were divided into 2 groups having 7 rabbits in each group. All does were taken to the buck's cages every evening for mating. In mating experiences, three productive male rabbits are equally used in both group.

Buserelin (Receptal inj., Topkim) (0.8 µg) was injected intramusculary with by single injection just after the natural mating to group 1. Rabbits of the group 2 were served as controls.

In the study, estrus symptoms, sexual activity, number of mating, rates of pregnancy and pseudopregnancy and litter size are observed and recorded.

RESULTS

11 Rabbits mated one time and 3 rabbits two times during August. We observed prominent redness and enlarges in vulva of 71.4% of mated rabbits. The results have been presented in table 1.

Table 1: Rates of pregnancy and pseudopregnancy and average litter size of groups.

Group	n	Pregnancy rate (%)	Pseudopregnancy rate (%)	Average litter size
1	7	28.5	42.8	4
2	7	—	57.1	—

Although no parturition was observed in second group, two rabbits from first group gave parturition. One of these two rabbits gave five litters (one of them is still-birth), and other three litters (two of them are still-birth).

In first and second groups 42.8% and 57.1% pseudo-pregnancy rates was observed, respectively. Pseudopregnancy continued about 15-17 days. During the pseudopregnancy abdominal growth and mamal growth were observed. Also in these animals nest preparing behaviour was seen.

DISCUSSION

Low pregnancy rate is the main problem in commercial Angora rabbits production. Especially in summer the reproduction productivity declines too much (Bekyürek, 1998; Schlolaut, 1988; Schlolaut, 1994).

Investigations have shown that GnRH and GnRH analoges use have increased the fertility while artificial or natural matings. Many workers indicated that buserelin is the most effective GnRH analogue (Dubiel et al. 1981; Dubiel et al. 1982; Hafez, 1987; Hoechst; Roustan and Maillot, 1990).

In the present study, all estrus symptoms exhibitted rabbits were mated naturally during August. Pregnancy rate was found 28% and average litter size 4 in group 1. Whereas no pregnancy was observed in control group.

Dubiel et al. (1981) were injected to rabbit 1 µg gonadoliberin which is analogue of GnRH. These rabbits were inseminated with native sperma in breeding season and they found pregnancy rate and litter size were 82% and 5.1, respectively.

Dubiel et al. (1982) administered 0.8-1.6 µg gonadoliberin to 8 rabbits via intramusculary route which were in the luteal phase and 1.6 µg gonadoliberin was administrated after 72 hours following 5 mg $PGF_2\alpha$ injection to 16 rabbits in the some condition. Ovulation was not observed gonadorelin

injected rabbits, however in both $PGF_2\alpha$ and gonadoliberin injected rabbit groups ovulation rate was 85%.

Several studies (Dubiel et al., 1981; Dubiel et al., 1982) show that the effect of GnRH on ovulation is related to the phase of rabbits cycyles. Rabbits must be in estrogenic phase for effective treatment of GnRH. Our rabbits were also in estrogenic phase during GnRH treatment.

Schololaut (1994) noticed that shearing may increase the mating and estrus rates. This point may effect on increasing estrus rate in summer season.

Theau-Clément et al. (1991) have injected 0.8 µg buserelin to ten French Angora rabbits in mating season and noticed that the buserelin injected group was ovulated 74%, but this rate was 28% in control group.

Roustan ve Maillot (1990) injected buserelin just after mating to 32 rabbits in postpartum period and they found 72.2% pregnancy ratio.

The controversial results of our study with the previous reports (Theau-Clément et al., 1991; Roustan and Maillot, 1990) may be related to the time of the experiments. Our study has been performed in summer time, however others in breeding season.

As a result, it was concluded that in summer time when fertility rates are so low, by the injection of one dose GnRH after natural mating to female Angora rabbits fertility rates was increased.

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