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THE EFFECT of GnRH and HCG ADMINISTERED at the TIME of ARTIFICIAL INSEMINATION on FERTILITY in LACTATING DAIRY COWS

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Laktasyondaki sütçü ineklere tohumlama sırasında GnRH ve HCG verilmesinin fertilite üzerine etkisi

SUMMARY

The objective of the present study was to determine the effects of GnRH and HCG used at the time of first artificial inseminations on pregnancy rates in cows. Sixtysix Friesian lactating cows with ages of 2.5 to 4 years were used. Animals were injected with 25 mg, i.m. of dinoprost tromethamine in diestrus and estruses were determined by clinical observations. Cows in estrus were divided into three groups and inseminated artificially after about 6 hours from the beginning of standing estrus. Twentyone cows (Group 1) were administered 100 mcg, i.m. of gonodorelin (GnRH), 25 cows (Group 2) were administered 1500 i.ü., i.m. of human chorionic gonadotropin (HCG) and twenty cows (Group 3, control) were applied no treatment at the time of artificial insemination (AI).

Pregnant and nonpregnant animals were diagnosed by rectal palpation after two months. Pregnancy rates did not improve in cows administered GnRH and HCG at the time of AI as compared to control cows. On the contrary, pregnancy rates in these animals decreased (66.66 % and 44.00 % versus 75.00 % in control group). This decrease in the Group 2 was statistically important ($P<0.05$).

The results of the present study suggest that dairy cows treated with GnRH and HCG 6 h after the beginning of standing estrus at the time of first AI have decreased pregnancy rates when compared to cows that don't have any treatment. These treatments may only be proposed in repeat breeders.

KEY WORDS: GnRH, HCG, pregnancy rates, dairy cows, artificialy insemination.

ÖZET

Bu araştırma, ineklerde ilk tohumlama zamanında GnRH ve HCG uygulamalarının gebelik oranları üzerine etkisini belirlemek amacıyla yapıldı. Materyal olarak laktasyon döneminde bulunan 2.5 – 4 yaşlarında 66 Holştayn inek kullanıldı. Hayvanlara diöstrus döneminde 25 mg Dinoprost Tromethamine i.m. enjekte edildi ve östruslar klinik olarak tespit edildi. Östrusa gelen hayvanlar 3 gruba ayrıldı ve östrusun başlangıcından yaklaşık 6 saat sonra tohumlandı. Tohumlama sırasında 21 ineğe (Grup 1) 100 mcg i.m. Gonodarelin (GnRH), 25 ineğe (Grup 2) 1500 İ.Ü i.m. HCG uygulandı ve 20 inek de (Grup 3) kontrol olarak bırakıldı.

Gebe ve gebe olmayan hayvanlar tohumlamadan 2 ay sonra rektal palpasyonla saptandı. Kontrol grubu ineklerle karşılaştırıldığında, tohumlama zamanında GnRH ve HCG uygulanan ineklerde gebelik oranlarında bir artışın olmadığı tespit edildi. Aksine, Grup 1 ve Grup 2' deki gebelik oranları (sırasıyla %66.66, %44.00), kontrol grubuna göre (%75.00) daha düşük elde edildi. Grup 2'deki gebelik oranlarındaki düşüş kontrol grubuna göre önemli bulundu ($P<0.05$).

Bu çalışmada, östrusun başlangıcından 6 saat sonra yapılan tohumlamalar sırasında GnRH ve HCG kullanılanlardan elde edilen gebelik oranlarının kontrol grubundaki ineklere göre daha düşük olduğu sonucuna varıldı.

ANAHTAR KELİMELER: GnRH, HCG, gebelik oranları, sütçü inekler, sun'i tohumlama.

INTRODUCTION

Gonadotropin releasing hormon (GnRH) is produced by neurons in the hypothalamus. It is then transported by nerve axons to the median eminence of the hypothalamus, where it is stored until released into the hypothalamo-hypophyseal portal blood vessels. These vessels carry the GnRH to the anterior pituitary gland. In the adenohypophysis, GnRH stimulates the synthesis and secretion of the gonadotropic hormones, luteinizing hormone (LH) and follicle stimulating hormone (FSH) (Elmore 1989). The rise in circulating LH provides a stimulus for the follicular phase increase in estradiol secretion from ovarian follicles. Estradiol, in turn, elicits the surge of LH that causes ovulation (Karsch et al. 1992). The lack of an ovulation-inducing LH surge in response to estradiol would result in failure of ovulation (Youngquist 1988). Ovulation takes place about 22 to 26 h after the LH peak (Hanlon et al. 1997) or 14 h after the end of estrus in cows though there is much individual variation within a range of 2-22 hours. Fertility is at its maximum during the last 8 h of estrus and declines slowly to 6 h after the end (Deas et al. 1979). A single injection (i.m.) of GnRH and GnRH agonists gives a predictable release of the both LH and FSH into the peripheral circulation over a 2 to 3 h period (Osawa et al. 1995, Thatcher et al. 1993). GnRH-induced effects can be indirect through their induced release of LH and FSH or perhaps direct effects of GnRH on reproductive tissues. The most dramatic increase in

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LH secretion during the estrus cycle is the endogenous preovulatory surge of LH occuring at the onset of estrus (Thatcher et al. 1993). Human chorionic gonadotropin (HCG) is produced by the cytotrophoblast of the chorionic villi in the human placenta. When administered to cows, HCG exerts primarily an LH effect with very little, if any, FSH effect. Clinically, HCG is a good exogenous source of LH activity (Elmore 1989). GnRH and HCG are commonly used in bovine practice to treat pathologic ovarian cysts, to hasten ovulation (Drost and Thatcher 1992, Elmore 1989, Garverick 1997) and to increase the size of the developing corpus luteum (Elmore 1989, Thatcher et al. 1993).

The objective of the present study was to determine the effect of GnRH and HCG used at the time of first artificial inseminations on pregnancy rates in cows.

MATERIAL and METHODS

This study was conducted between July 1996 and October 1996 at a dairy herd in Van, Turkey. Sixtysix Friesian lactating cows with ages of 2.5 to 4 years were used. They had a normal puerperium and they were free of cystic ovarian follicles, abnormal genital discharges and anatomical abnormalites of the reproductive tract detectable by palpation per rectum. At the onset of treatment all animals were in health and in good body condition. Animals were injected with 25 mg i.m. of dinoprost tromethamine (PGF2α, Dinolytic; Eczacıbaşı) in diestrus and estruses were determined by clinical observations. Cows in estrus were divided into three groups and inseminated artificially after about 6 h from the beginning of standing estrus. Twentyone cows (Group 1) were administered 100 mcg i.m. of gonodorelin (GnRH, Ovarelin;DİF), 25 cows (Group 2) were administered 1500 i.u., i.m. of human chorionic gonadotropin (HCG, Pregnyl; Organon) and 20 cows (Group 3, control) were applied no treatment at the time of artificial insemination (AI). Pregnant and nonpregnant animals were diagnosed by rectal palpation after two months. Pregnancy rates of the three groups were compared to each other by the student's test (Kutsal et al. 1990).

RESULTS

Pregnancy rates did not improve in cows administered GnRH and HCG at the time of AI as compared to control cows. On the contrary, pregnancy rates in these animals decreased. This decrease in the Group 2 was statistically important ($p<0.05$) (Table 1).

DISCUSSION

The ability to hasten ovulation at the time of AI by the use of exogenous hormone treatment is expected to increase conception rates. GnRH plays a major role in the induction of ovulation. Whereas an improved pregnancy rate has been found in cows treated before or at the time of insemination by some outhers, others did not observe an improvement in pregnancy rates after the same treatment (Filho et al. 1992).

GnRH and HCG are used in repeat breeder cows at the time of estrus to promote ovulation and at about 4 days after ovulation to increase the size of the developing corpus luteum (Elmore 1989). It is assumed that, these hormones elicit a relatively equivalent therapeutic response, in terms of both endocrine and clinical responses (Drost and Thatcher 1992). Administration of GnRH at the time of insemination in repeat breeder cows (after more than two infertile services) improves fertility (Drost and Thatcher 1992, Nell et al. 1992, Thatcher et al. 1993). In the present study, GnRH (gonadorelin) and HCG were administered to normal cows at the time of first AI but pregnancy rates did not improve like reported for the first services in the other studies (Drost and Thatcher 1992, Nell et al. 1992). In contrast, pregnancy rates were low when compared to control cows which had not have a treatment at the time of AI.

It was reported that the injection of GnRH at the time of a single insemination (12-16 h after the onset of estrus) produced the highest pregnancy rates though GnRH treatment at the time of first services has met with poor results. Pregnancy rates at first services accompanied by GnRH administration could have been reduced by altering either the timing of insemination or the timing of GnRH injection, except injections given near the onset of estrus followed by insemination 12h later resulted in normal fertility at first service (Drost and Thatcher 1992). Also, decreased pregnancy rates in our study in which GnRH and HCG injections were made 6 h after beginning of standing estrus at the time of first AI can be resulted from the timing of injections and AI.

The results of the present study suggest that dairy cows treated with GnRH and HCG h after the beginning of standing estrus at the time of first AI have decreased pregnancy rates when compared to cows that do not have any treatment. These treatments may only be proposed in repeat breeders.

Table 1. Numbers and Rates of Pregnancy and Nonpregnancy in Cows Administered GnRH and HCG at the Time of AI.

GnRH (Group 1)			HCG (Group 2)			Control (Group 3)		
Pregnancy	Nonpregnancy	Total	Pregnancy	Nonpregnancy	Total	Pregnancy	Nonpregnancy	Total
14 (n)	7(n)	21 (n)	11 (n)	14 (n)	25 (n)	15 (n)	5 (n)	20 (n)
66.66% a	33.33%		44.00% b	56.00		75.00% c	25.00%	

a,b: $p>0.05$
a,c: $p>0.05$
b,c: $p<0.05$

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