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Short Communication

Effect of GnRH on Embryo Recovery and Quality in Crossbred Sahiwal Cows*

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ABSTRACT

Effect of GnRH on embryo recovery and quality in crossbred Sahiwal cows was studied in 12 crossbred (HF x Sahiwal) cows divided in two groups (Group A: 6 cows without GnRH and Group B: 6 cows with GnRH). For induction of superovulation, FSH-P (Folltropin-V, Bioniche Animal Health, Canada, @ 200 mg per donor in 8 equally divided doses of 1.25 ml each) was administered by i.m. route over 4 days at 12 hr interval, starting day 9 -11 post estrus. A single dose of $PGF_2\alpha$ (Iliren, Intervet, @ 5 ml) was given i.m. 48 hr after the first FSH injection, to bring the donor in heat. First AI was done 48 hr after PG injection, followed by two more inseminations at 12 hr intervals. A dose of 2.5 ml Receptal (10.5 µg Buserelin Acetate, GnRH Analogue, Intervet International, GmbH, Germany) was given i.m. to cows of Group B only at the time of first AI. On day 7 of first AI, cows were flushed for embryo recovery. Among 6 cows (Group A), only 4 (66.67%) responded to FSH treatment with the total number of CL to be 28 (7.00/donor) and a total of 17 (3 viable, 3 degenerated and 11 UFO) embryos. The mean recovery of total and viable embryos (VE) for responded cows and overall were found to be 4.25 and 0.75 and 2.83 and 0.50 embryos per flush, respectively. Among 6 cows (Group B), 5 (83.33%) responded to FSH treatment with the total number of CL to be 31 (6.20/donor) and a total of 21 (12 viable, 3 degenerated and 6 UFO) embryos. The mean recovery of total and viable embryos for responded cows and overall were found to be 4.20 and 2.40 and 3.50 and 2.00 embryos per flush, respectively. There was a significantly higher recovery of viable embryos in Group B (12 VE; @ 2.0/flush) than of Group A (3 VE; @ 0.5 /flush). The quality of viable embryos recovered from Group B (with GnRH) was higher (83.33% grade A and 16.67% grade B) than Group A (66.67% grade A and 33.33% grade B). It was concluded that injecting GnRH at the time of AI in superovulated cows is helpful in increasing the fertilization rate and recovery of more viable embryos of superior quality.

Key words: GnRH, Embryo recovery, Crossbred Sahiwal cows.

INTRODUCTION

Maximum utilization of female genetics has been possible with the advent of embryo transfer (ET) technique. In India, early work done on ET in cattle was reported by Zanwar (1988). Subsequently, enough work was carried out in cattle and buffaloes. There are many limitations in practicing this technology in India including low superovulatory response and recovery of total and viable embryos in Zebu cattle and their crosses. The use of GnRH at the time of insemination has many beneficial effects on the various physiological events involved, viz., multiple ovulations, tubal transport, fertilization, descent of zygote to uteri, embryonal morphology and survival. Agarwal *et al.* (1993) found better superovulation response and embryo recovery in GnRH treated crossbred cattle. Rawat *et al.* (2007) reported recovery of higher number of total and viable embryos in GnRH treated cattle though the results were non-significant. Similar findings have been reported by Foote *et al.* (1989) and Posadas *et al.* (1991). The present study was therefore planned to study the effect of GnRH on embryo recovery and quality in crossbred Sahiwal cows.

Materials and Methods

Twelve crossbred (HF x Sahiwal) cows were selected for superovulation and embryo recovery studies, comprising Group A (n=6; no GnRH inj.) and Group B (n=6; GnRH inj.). Selected cows were true representatives of the breed with good production potential and reproduction performance. They were healthy and

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free from any general or genital diseases/abnormality. Synchronization of estrus was achieved by two injections of $PGF_2\alpha$ (Iliren, Intervet International, GmbH, Germany), 5 ml, i.m. at an interval of 11 days. Observed synchronized estrus was considered as Day 0 for initiating FSH treatment at Day 9 -11 of synchronized estrus. Before initiating FSH treatment, cows were examined per rectally to ensure the presence of functional corpus luteum (CL) on either ovary of each cow. Then cows were subjected to standard superovulation treatment protocol recommended by the manufacturer of Folltropin-V (Bioniche Animal Health, Canada). However, the dose was reduced to half as suggested by Patel *et al.* (2007) for crossbred cattle. Dose of 1.25 ml (25 mg NIH) FSH was administered i.m. in the morning and evening (at 12 hr interval) for 4 days. A single dose of 5 ml $PGF_2\alpha$ (Iliren) was injected 48 hr after the first FSH injection, to bring the cows in heat. Cows were found in estrus 36 to 48 hr after $PGF_2\alpha$ injection.

The cows of Group A and B were inseminated thrice with the best quality crossbred (HF x Sahiwal) semen. First AI was done on Day 5 of FSH treatment in the morning followed by two more inseminations at 12 hr intervals. A dose of 2.5 ml Receptal (10.5 µg Buserelin Acetate, GnRH Analogue, Intervet International, GmbH, Germany) was given i.m. to the cows of Group B only, at the time of first AI.

On Day 7 of first AI, cows were examined per rectally to ascertain superovulation response. Cows having two or more CL on one or both ovaries were considered as responded to FSH treatment, whereas presence of less than two CL on either ovary was considered as non-responded. All cows were subjected to embryo recovery (Siddiqui *et al.* 1999). Out coming media was passed through pre-sterilised Emcon embryo filter. The recovered media was examined under stereo zoom microscope and recovered ova and/or embryos were classified as viable embryos, degenerated embryos and unfertilized ova. Viable embryos were graded as A (Excellent) and B (Good) grades as per their quality. The superovulatory response, embryo recovery rate and quality of embryos were compared for cows under both the groups

RESULTS AND DISCUSSION

Out of six cows under Group A (No GnRH), 4 (66.66%) responded to FSH treatment and 28 ovulations took place (7.00 ovulations/donor) with an overall 29 ovulations (4.83 ovulations / donor) for Group A. No un-ovulated follicle was found on ovaries of any donor at the time of embryo recovery. Only 3 viable embryos were recovered having their quality either excellent or good as Grade A (n=2, 66.67%) and B (n=1, 33.33%) embryos, respectively.

From 6 cows under Group B (GnRH), 5 (83.33%) responded to FSH treatment with 31 ovulations (6.20 ovulations/donor) with an overall 32 ovulations (5.33 ovulations/ donor) for the Group B. At the time of embryo recovery, one unovulated follicle was found on the ovary of one donor which responded to FSH treatment. A total of 12 viable embryos were recovered having their quality to be either excellent or good as Grade A (n=10, 83.33%) and B (n=2, 16.67%) embryos, respectively. The detailed results are presented in Table 1.

Cows of Group B had comparatively higher number of total ovulation (n=32) as compared to cows under Group A (n=29), with the difference being non-significant. Similarly, total embryos recovered were also higher for cows under Group B (n=21) than of Group A (n=17). Similarly, there was no significant difference in the quality (excellent/ good) of viable embryos recovered in Group A and Group B. However, there was significantly higher recovery of viable embryos in Group B (12 viable embryos; @ 2.0 viable embryo/flush) than Group A (3 viable embryos; @ 0.5 viable embryo/flush), i.e. four times more viable embryos from GnRH treated cows (Group B) than cows under Group A. The higher number of viable embryos obtained from the cows under Group B is obviously indicative of positive role or contributory effect of GnRH, being injected at the time of first AI, on the various physiological events involved, viz., superovulation, tubal transport, fertilization, descent of zygote to uteri, embryonal morphology and survival. Better superovulation response and embryo recovery, in GnRH treated cows, obtained in this study conform to the findings of Agarwal *et al.* (1993) in crossbred cattle. The present findings are comparable with the findings

represented by Lee *et al.* (1983), Stevenson *et al.* (1984), Mee *et al.* (1990), Morgan *et al.* (1993) and Sharma *et al.*. (2006), who have reported increased conception rate following administration of GnRH or GnRH analogues at the time of AI in dairy cattle. The increased number of viable embryos recovered from GnRH injected cows can be attributed to the beneficial effect of GnRH injection to cows at the time of first AI after superovulation treatment.

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