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Short Communication

Superovulation Response, Embryo Recovery and Quality in Sahiwal Cows and Heifers*

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ABSTRACT

Superovulation response, embryo recovery and quality in Sahiwal cows and heifers were studied in 12 animals divided in two groups (Group A: 6 Sahiwal cows and Group B: 6 Sahiwal heifers). 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 i.m. over four 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 donors in heat. First AI was done 48 hr after PG injection, followed by two more inseminations at 12 hr intervals. On day 7 of first AI, all the donors were flushed for embryo recovery. Among 6 Sahiwal cows (Group A), only 3 (50.00%) responded to FSH treatment with the total number of CL to be 17 (5.67/donor) and a total of 10 (3 viable and 7 degenerated) embryos. The mean recovery of total and viable embryos (VE) for responded donors and overall were found to be 3.33 and 1.00 and 1.67 and 0.50 embryos per flush, respectively. All Sahiwal heifers (Group B) responded to FSH treatment with the total number of CL to be 50 (8.33/donor) and a total of 37 (18 VE; 2 UFO; 1 zona and 16 degenerated) embryos. The mean recovery of total and viable embryos was found to be 6.17 and 3.00 embryos per flush, respectively. Sahiwal heifers (Group B) yielded comparatively higher number of mean ovulations (8.33) and embryos, both total (6.17) as well as viable (3.00), than those of the cows under Group A (3.17, 1.67 and 0.50, respectively). Based on the results obtained, it was concluded that since Sahiwal heifers had much better supersovulation response to gonadotrophin treatment and higher recovery of total and viable embryos as compared to Sahiwal cows, heifers can be used as potential embryos donors.

Key words: Superovulation, Embryo recovery, Sahiwal cows

INTRODUCTION

Multiple ovulation and embryo transfer (MOET) technique is widely used to produce breeding stock (males and females) ensuring the most benefits of both the parents, the best among population. Enough data is available on superovulation, embryo recovery and quality in exotic cattle (Lindsell *et al.* 1986; Rajamahendran *et al.* 1987; Siddiqui *et al.* 1999). However, limited work is done on Zebu and crossbred cattle (Agarwal *et al.* 1992; Mishra *et al.* 2002; Patel *et al.* 2007). There are many limitations in practicing this technology in India, viz. low superovulation response and low recovery of viable embryos in Zebu cattle. Among cattle, *Bos indicus* breeds have a greater sensitivity to gonadotropins, a shorter duration of estrus, and more often express estrus during the night (Baruselli *et al.* 2006). In view of this, the present study was undertaken to see the effect of gonadotrophin (FSH) in low doses on superovulation response, embryo recovery and quality in Sahiwal cows and heifers.

MATERIALS AND METHODS

Six each Sahiwal cows (Group A, n=6) and Sahiwal heifers (Group B, n=6) were selected for MOET studies. Selected animals were true representatives of the breed with good production potential as well as reproduction performance.

While selecting the donors, due care was taken to ensure that selected animals were healthy and free from any general or genital diseases/abnormality. The age of donor cows and heifers ranged from 39 to 134 months with an average of 81 months and 21 to 27 months with

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an average of 24 months, respectively. The average weight of donor cows and heifers ranged from 400 to 500 kgs and 300 to 400 kgs, respectively. Synchronization of estrus of selected donors 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, donors were examined per rectally to ensure the presence of functional corpus luteum (CL) on either ovary of each donor. Then donors were subjected to the standard superovulation treatment protocol 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-P1) was administered i.m. in the morning and evening (at 12 hourly 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 donors in heat. Donors were found to be in estrus 36 to 48 hr after $PGF_2\alpha$ injection.

Donors of Group A and B, respectively, were inseminated thrice with the best quality frozen Jersey semen. First AI was done on day 5 of FSH treatment in the morning 48 hr after the prostaglandin injection (except in cases where donors came in heat early, i.e., 36 hr after the prostaglandin injection, the insemination was done on day 4 of FSH treatment in the evening) followed by two more inseminations at 12 hr interval. Three heifers of Group B exhibited standing heat 12 hr earlier than the expected time of estrus. Accordingly, they were inseminated 12 hr earlier than the scheduled time.

On day 7 of first AI, donors were examined per rectally to ascertain superovulation response. Donors having two or more corpora lutea (≥2CL) on one or both the ovaries were considered as responded, whereas

less than two CL as non-responded donors. All donors were subjected to embryo recovery (Siddiqui *et al.* 1999) Out coming media was passed through pre-sterilised Emcon embryo filter (75 µ pore size). Since, 3 heifers of Group B exhibited standing heat after 36 hr of prostaglandin injection and accordingly were inseminated 12 hr earlier than the scheduled time, the embryo recovery in these donors was carried out at day 7 ½ from the first AI.

The flushing fluid collected in the embryo filter was transferred to sterile petri-dishes and examined under stereo zoom microscope. The 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 superovulation response, embryo recovery rate, grades and quality in Sahiwal cows and heifers were compared for responded and non-respond donors within and between groups

Results and Discussion

Among 6 Sahiwal cows treated for superovulation (Group A), 3 (50.00%) cows responded to treatment having ≥2CL, with a total of 17 ovulations (5.66/donor) comprising 10 (58.82%) on the right ovaries and 7 (41.18%) on the left ovaries. Two unovulated follicles were also found on right ovary of one cow. Responded cows yielded a total of 10 embryos with 3 (30.00%) viable embryos and 7 (70.00%) non-viable (degenerated) embryos. The mean recovery of total and viable embryos was found to be 3.33±1.67 and 1.00±1.00 embryos per flush, respectively among responded cows, whereas, it was 1.67±1.05 and 0.50±0.50 embryos per flush, respectively of all the cows (responded and non-responded). The quality of 3 viable embryos was excellent/good having their morphological features falling into either A (n=1) or B (n=2) grade. Mean recovery rate of total (1.67±1.05) and viable (0.50±0.50) embryos obtained in Sahiwal cows with Folltropin-V 200 mg NIH was found to be comparatively much lower than values (6.83 and 5.16) reported by Mishra *et al.* (1997) with 28 mg FSH-p (equivalent to 320 mg NIH-FSH-P) in Sahiwal cows. Mishra *et al.* (2002) also reported higher recovery of mean total (2.50) and viable (2.17) embryos with 200 mg NIH Folltropin in Sahiwal cows as compared to the present observations. Moreover, they reported better recovery rates (5.00 and 4.00, total and viable embryos, respectively) using 300 mg NIH Folltropin in the same study. Babu Rao *et al.* (2005) also reported comparatively higher mean recovery rates of 2.88 total embryos and 1.25 viable embryos in Ongole cows using 400 mg NIH Folltropin.

All (100.00%) Sahiwal heifers (Group B) responded to treatment having ≥2CL with a total of 50 ovulations (8.33/donor) comprising 30 (60.00%) CL found on right ovaries and 20 (40.00%) found on left ovaries. Two unovulated follicles were found on right ovary of one donor. Heifers yielded a total of 37 embryos comprising 18 (48.65%) VE, 2 (5.41%) UFO, 1 (2.71%) zona and 16 (43.24%) degenerated embryos. The mean recovery of total and viable embryos was found to be 6.17 and 3.00 embryos per flush, respectively. The quality of 18 viable embryos, recovered from the donor heifers under the group, was excellent/good having their morphological features falling into either A (n=12) or B (n=6) grades. The detailed results are presented in Table -1. The cent per cent response to superovulation treatment in Sahiwal heifers using FSH-P corroborated with the findings reported by Raju *et al.* (1996) in Hariana heifers using FSH-E. Similarly, 50% response to superovulation treatment in Sahiwal cows is almost in agreement with the findings reported by Agarwal *et al.* (1992) in Hariana cows using 32 mg of FSH-P.

Based on the observations, it was concluded that Sahiwal heifers have performed much better than cows in view of response to supersovulation treatment. Chagas e Silva *et al.* (2002) also found the similar results in heifers as compared to cows. Superior response of heifers to superovulation treatment might be due to the presence of more number of primordial follicles in heifers than in cows and better ovarian response to administration of exogenous gonadotropin in heifers.

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