

Effect of porcine and equine FSH on embryo quality in Sahiwal cows

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ABSTRACT

The present study revealed significantly ($P < 0.01$) higher embryo recovery and their quality using FSH-P than FSH-E. The use of follicle stimulating hormone from porcine source has been found better in comparison to follicle stimulating hormone from equine sources for super ovulating indigenous cattle.

Key words : Superovulation, FSH, embryo, cattle

Enormous variability in ovarian response following superovulation is one of the most important limiting factors in bovine embryo transfer. Unpredicted response of superovulation in the animals leads to high cost of embryo production in conventional embryo transfer program (Armstrong, 1995). The availability of a reliable screening method prior to superovulation induction could reduce the high percent of donors responding with poor ovulation rates.

There is decrease in the fecundity with the advancement of age (Erikson *et al.*, 1976), fertilization rate and embryo recovery (Hasler *et al.*, 1983; Lerner *et al.*, 1986) in cattle and other mammalian species. Superovulatory response decreases with the advancement in age in caprine (Sarmah *et al.*, 1999). PMSG resulted in higher ovulation rate in heifers than in cows (Voss *et al.*, 1983). Total embryo recovered per collection remained the same for 3-9 and 10-22 years of age. However, number and percentage of transferable embryos for 3-9 years of age was higher than for 10-22 years of age (Donaldson, 1984). The present study was planned with the objective to study the quality as well as embryonic development following superovulatory treatment with two different sources of gonadotrophin i.e. porcine and equine in Sahiwal cows.

The study was conducted on animals of Livestock Research Centre (LRC) of G.B. Pant University of Agriculture and Technology, Pantnagar (Udham Singh Nagar), Uttaranchal involving Sahiwal cows as embryo donor animal. All the animals were kept at LRC under uniform conditions of feeding and managerial practices throughout the experimental period. The animals were in 3rd to 5th lactation with no history of any pathological abnormalities. The animals were divided into two groups and they were subjected to superovulatory treatment starting from day 10 of estrous cycle (day 0 = day of estrous) by using FSH-P and FSH-E @50 mg and 400 mg NIH respectively in 8 divided doses morning and evening at the interval of 12 hours between days 10-13 of the cycle.

The animals were bred thrice at the interval of 12 hours to the superovulatory heat with frozen Sahiwal semen. Embryos were collected by non-surgical methods on day 7 of superovulatory estrus.

Mean transferable, degenerated and unfertilized embryos were 2.40 ± 0.92 , 0.40 ± 0.40 , 1.40 ± 0.87 in FSH-P treated group which were significantly ($P < 0.01$) higher compared to FSH-E group in which corresponding values were 0.56 ± 0.33 , 0.11 ± 0.11 , 0.22 ± 0.14 respectively. The response of FSH-P treated group was better in comparison to the FSH-E treated group; it could be due to less content of LH in Follitropin in comparison to equine FSH. High amount of LH is harmful to folliculogenesis

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and lead to premature ovulation (Callesen *et al.*, 1986). This variation in ovarian response to the gonadotrophins may be due to difference in dose of the gonadotrophins. Bowen (1973) proved that different dose schedule for superovulation elicited different level of ovarian response. Mean overall transferable embryos were 1.13 ± 0.42 per donor. These results are comparable to Mishra and Mishra. (1998).

High doses of FSH can also cause hypersecretion of progesterone 2-4 days post-estrus. Embryos are normally in oviduct during this period and do not enter the uterus until day 4. However, abnormally high level of progesterone may eventually push the embryos prematurely into the uterus. The uterine environment, being hostile to embryo prior to day 4, may halt cleavage and cause embryo degeneration (Totey *et al.*, 1988). In the present study degenerated embryos were 29.62% and 12.5% respectively in FSH-P and FSH-E treated groups.

Developmental stages of embryos, 8-16 cells, Morula and blastocyst were 1.2 ± 0.44 , 2.2 ± 0.85 and 0.20 ± 0.16 respectively in FSH-P treated animals which were significantly higher ($P < 0.01$) compared to FSH-E treated animals. The corresponding values were 0.0, 0.56 ± 0.33 and 0.0 respectively. Totey *et al.* (1988) compared the 50 mg and 28 mg regimen of FSH (given in reducing doses for 4 days) in Holstein and Holstein-Sahiwal cross cattle. Mean number of corpus luteum, embryos per donor and number of transferable embryos per donor for 50 mg group were 6.1, 2.2 and 1.0 while it was 6.7, 4.2 and 3.0 for the 28 mg group. In the cows on the 50 mg regimen, high incidence of unovulated follicles, low embryo recovery rate and high proportion of degenerated and unfertilized embryos were seen. In the present study also mean transferable embryos per donor were 1.13 ± 0.42 . This finding agrees well with the above authors.

Breed and management of animals also have important effect on embryo production and pregnancy rates. Donaldson (1984) have reported that the Zebu cattle are one of the lowest producers of transferable embryos (39%) but have one of the best pregnancy percent after embryo transfer (56%).

Nemat Ullah *et al.* (1998) conducted a study on superovulatory response to FSH in purebred Sahiwal cows. Of the 18 attempts the donor cows responded only

7 times (39%) with 2 or more than 2 corpus luteum, rest 11 attempts were non-responsive. The corpus luteum recorded and embryo recovered in the responding cows was 7.6 ± 1.8 and 5.7 ± 1.9 . Eleven transferable embryos were obtained and overall calving rate was 27.3 per cent. However, Mishra *et al.* (1996) have reported mean CL per cow to 9.16 ± 4.41 and mean transferable embryos per cow to 5.33 ± 4.19 in Sahiwal cow. In the present study total thirty-five embryos could be recovered, out of them 17 (48.57%) were transferable with an average of 1.13 ± 0.42 embryos per donor. These finding are comparable to Nemat Ullah *et al.* (1998) but these were lower than reported by Mishra *et al.* (1996).

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