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SUPEROVULATION AND EMBRYO RECOVERIES IN RATHI (*BOS INDICUS*) CATTLE: EFFECT OF EQUINE CHORIONIC GONADOTROPIN OR PORCINE FSH

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ABSTRACT

The embryo recovery following superovulatory (SOV) treatment using equine chorionic gonadotrophin (eCG) and porcine follicular stimulating hormone (FSH) in native Rathi (Bos indicus) cattle was studied. In treatment I (n=33) 2000 IU of eCG was injected on day 8 of the natural estrus. In treatment II (n=17) donors received six 12 h im descending doses of porcine FSH (Super OV, Ausa International, USA) on day 8 to 10 of natural estrus. Animals were induced to estrus by PG injections followed by two inseminations 12 h apart at standing estrus and embryos were recovered by non-surgical means. The overall superovulatory response in the two treatments was 81.8 and 94.1 percent, respectively. Significant (P<0.01) differences were observed between the treatments for the superovulatory response and number of unfertilized ova (UFO) recovered. The results suggest that superovulation and embryo recoveries in native Rathi cattle are better with FSH than eCG.

INTRODUCTION

Embryo transfer technology offers the chance to increase the overall rate of progress in genetic improvement, increase the productivity of a particular female and shorten the generation interval. The technology has been standardized and is in routine practice in many breeds of *Bos Taurus* cattle, but is yet to be standardized in various breeds of *Bos indicus*, having good adaptability in harsh tropical climate conditions. Rathi breed, native to the Thar desert in western Rajasthan, India is one of such breeds having excellent milk production potential.

Superovulatory response and embryo recovery in cattle is highly breed specific (Breuel *et al*., 1991). Moreover, endocrine differences at the hypothalamo-pituitary gonadal level between *Bos taurus* and *Bos indicus* cattle (Randel and Mosby, 1977, Harrison *et al*., 1982, Randel, 1983)) may produce different effects on both the superovulatory response and embryo production (Bastidas and Randel, 1987). The present study was undertaken to study the results of superovulation and embryo recoveries in Rathi cattle using equine chorionic gonadotrophin (eCG) and porcine follicle stimulating hormone (FSH).

MATERIAL AND METHODS

The study was carried out at the Department of Veterinary Obstetrics and Gynaecology, College of Veterinary and Animal Science, Bikaner.

Experimental animals

Adult Rathi cows having calved at least once and with clinically normal ovaries and uterus were used as donors. Two estrus periods were observed prior to superovulatory treatment. The donors were stall fed with chaffed Sewan (*Lasirus indicus*) grass and concentrates.

Superovulatory treatments

In treatment I (n=33) donor cows were treated with a single i.m. injection of 2000 IU of eCG (Folligon, Intervet, Netherlands) on day

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8 of the natural estrous cycle followed by 5 mL i.m. injection of prostaglandin $F_2\alpha$ (Iliren, Hoechst) 48 h later to induce estrus.

In treatment II (n=17) donors were treated with porcine FSH (Super-OV, Ausa International, Tyler USA). Six descending doses of porcine FSH (2.5, 2.5, 1.5, 1.5, 1.0, 1.0 mL) were administered i.m. at 12 h interval starting from day 8 of a natural estrous cycle. Prostaglandin $F_2\alpha$ was given at the time of fifth FSH injection.

The treated cows in both the groups were observed closely for symptoms of estrus and were inseminated twice at 12 h interval during standing estrus. The superovulatory response was assessed by counting the number of corpora lutea (CL) by rectogenital palpation on day 7 of insemination, when embryos were collected by non-surgical uterine flushing using Dulbecco's phosphate buffered saline (Sigma, USA) with 0.1 % bovine serum albumin (Sigma, USA). Embryos were recovered as per method described by Purohit *et al*. (2000). Embryos were searched under stereozoom microscope and graded as unfertilized ovum, degenerated morula and blastocysts as per previously described methods (Shea, 1981 and Stringfellow *et al*., 1990).

Statistical analysis

The least square means and their SE for the two treatments were compared by one way ANOVA (Snedecor and Cochran, 1968).

RESULTS AND DISCUSSION

In treatment I, twenty seven out of 33 cows superovulated (superovulatory rate SR, 81.8 per cent). In treatment II superovulatory rate (SR) was 94.1 per cent, the difference was significant (P<0.01). The estrus induction time did not differ significantly between the treatments groups. In treatment I, six (6/33) animals did not show any superovulation with the total superovulatory response (SR) being 81.8percent. Likewise in treatment II one donor did not show any superovulation and the SR was 94.1 per cent. Previous studies have also shown better superovulatory response with FSH as compared to eCG (Elsden *et al*., 1978; Monniaux *et al*., 1983 and Jordt and Lorenzini 1988). The number of CL, total ova recovered, degenerated ova and morula/blastocyst did not differ significantly between the two groups although treatment II had a higher number of fertilized eggs and morula/blastocyst recovered. However, the number of unfertilized ova was significantly higher (P<0.01) in treatment I group in comparison to treatment II (Table 1).

Table 1. Treatment wise least square mean±SE of superovulation and embryo recovery parameters in Rathi cattle

Treatment	CL	TO	FO	UFO	M/B	DE	Estrus induction (h)
I (eCG)	11.4 ±1.6	8.6±1.5	5.2±1.2	3.2±0.7**	4.1±1.2	1.0±0.6	40.4±5.9
II (FSH)	11.4±1.6	7.4±1.6	6.5±1.4	0.7±0.7	4.6±1.2	1.9±0.6	41.6±6.0

CL - No. of corpus luteum;
TO - Total ova recovered;
FO - Fertilized ova;
UFO - Unfertilized ova;
M/B - Morula/Blastocyst;
DE - Degenerated embryos;
* - Highly significant (P≤0.01) by ANOVA.

The number of unfertilized ova was significantly lower with FSH treatments as compared to eCG treatments, but the number of morula/blastocysts recovered were non-significantly higher in FSH treatments compared with eCG. Elsden *et al*., (1978), and Monniaux *et al*., (1983) reported a better recovery of morula/blastocysts using purified FSH. Various other studies (Donaldson, 1984; Breuel *et al*., 1991) have shown that cattle breed has a masked effect on the number of ova and transferable embryos and this could be the reason for lower number of morula/blastocysts in the present study. Hahn (1992) have suggested that high degree of unexplained variability in superovulation leads to the hypothesis that the variability can be a special biological function, which supports natural selection over the long term.

It was concluded that superovulation and subsequent embryo recoveries in native Rathi cattle were higher when treated with FSH than eCG. The eCG resulted in significantly higher number of unfertilized ova.

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