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Original Research Article

Effect of Hormonal Therapy on Fertility in Repeat Breeding Gir Cows

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A B S T R A C T

The study was carried out to investigate the effect of various hormones on fertility performance in repeat breeder Gir cows. The cows were randomly allotted to four groups; Group-I (n=12), administered with inj. Hydroxy progesterone caproate @ 250mg intramuscularly on 5th day of post insemination; Group-II (n=12) received intramuscular injection of GnRH @ 20mcg and Group-III (n=12) treated with 1500IU of human chorionic gonadotropin at the time of artificial insemination, whereas, Group-IV (n=12) had cows inseminated without any hormonal therapy and kept as control. Pregnancy diagnosis was performed on day 60 by rectal palpation. The conception rates in Group-I, II, III and IV were 33.33, 66.66, 50.00 and 25.00%, respectively. The results were best with GnRH followed by hCG treatment. In conclusion, GnRH and hCG may serve as an excellent tool for improvement of pregnancy rate in repeat breeder Gir cows.

Keywords

Gir cows, Repeat breeder, GnRH, hCG, Progesterone

Introduction

Gir cows, now-a-days become most popular and demanding milch breed throughout the country. However, their lifetime productive performance is regulated by normal rhythm of reproduction which is characterised by onset of estrus, ovulation, fertilization, pregnancy and on time resumption of postpartum ovarian cyclicity. Generally the cows suffered with repeat breeding possesses normal reproductive tract and express regular oestrus cycle but fail to conceive within 3 services to a fertile bull or inseminations. This condition has been studied extensively in cattle (Reddy *et al.*, 2001, Sharma *et al.*, 2006). The cyclic manifestation of reproductive cycle in repeat breeding and normal cows are controlled by uterine luteolysin, estrogen and progesterone hormones liberated from ovarian structures. Beside, the progesterone hormone is essential for establishment of pregnancy as well as its maintenance in cattle and buffaloes. It plays an important role in implantation of embryo into the uterine wall, but luteal dysfunction leads to inadequate production of progesterone after breeding which causes early embryonic death (Kastelic, 1994). Several studies have been carried out on progesterone and estrogen hormones to diagnose pregnancy, embryonic mortality and status of ovaries in normal fertile and repeat breeding crossbred cattle (Sharma *et al.*, 2007) and buffaloes (Panchal *et al.*, 1991). However, similar information in zebu cattle is meagre and needs to be investigated.

The synchrony between embryo survival and maternal environment is essential to restore normal fertility in repeat breeding animals. It can be maintained by correlation of adequate luteal function either by exogenous supplementation of progesterone or stimulations of steroidogenesis by advocating leutinizing hormone. Administration of GnRH or hCG at the time of insemination favours LH surge, which results in improved pregnancy rate (Methwe *et al.,* 2013). However, response to such therapy differed in different animals (Reddy *et al.,* 2001 and Sharma *et al.,* 2003). Therefore, a suitable hormonal remedy is to be evolved. The present study documents the efficacy of GnRH, hCG and progesterone on conception rate in repeat breeder Gir cows.

Materials and Methods

Animals, Ration and Experimental Design

The present study was carried out on forty eight apparently healthy repeat breeder Gir cows maintained at Cattle Breeding Farm, Junagadh Agricultural University, Junagadh. The cows had moderate body condition with body weight ranging from 350 to 450 kg and were of 2 to 6 parity with the average milk production of 2500 to 3000 liters per lactation. All the animals were fed green fodder, hay, compounded concentrate and mineral mixture as per the standard feeding schedule on the farm.

Throughout the study period, animals were maintained under similar feeding and other farm practices under loose housing system of management. Experimental animals were dewormed at regular interval for internal and external parasitism. A strict prophylactic vaccination measure was also followed against the endemic diseases. The cows were regularly screened gynaeco-clinically for their reproductive status.

Treatment Protocols

Total forty eight normal cyclic and apparently healthy female Gir cows were randomly divided into four treatment groups with twelve animals each. The repeat breeder (RB) cows were selected based on history of failure to conceive even after 3 or more breeding with fertile semen and having the normal genital tract, healthy discharge and nearly normal estrous cycle length.

Group-I (n=12) treated with Hydroxy Progesterone Caproate (P-Depot, Zydus Animal Health) @ 250 mg intramuscularly on 5th day post breeding, Group-II (n=12) treated with GnRH (Buserelin acetate-Receptal, Intervet) 5ml and Group-III (n=12) administered with Leutinizing hormone (Chorulon, Intervet) @ 1500 IU by intramuscular route immediately after insemination. Group-IV (n=12) had animals inseminated without any hormonal therapy and kept as control. In all the groups estrous was detected by visual observations and cows were bred with semen of fertile bull. The pregnancy diagnosis was performed at 60th day post breeding by per rectal examination.

Statistical Analysis

The data were compiled, expressed as percent for better interpretation and analyzed statistically. The variation between groups in estrous response and conception rate was compared by chi-square test and considered as significant if 'p' ≤ 0.05.

Results and Discussion

Results pertaining to fertility rate in repeat breeding Gir cows are presented in Table-1.

The conception rates in Group-I, II, III and IV were observed to be 33.33, 66.66, 50.00 and 25.00%, respectively. The conception rate was higher in group-II, followed by group-III and I and lowest in untreated control group-IV. The results were statistically non- significant, except between group-II and IV.

The highest conception rate in group-II (66.66%) is close agreement with Senthilkumar *et al.,* (2017) in dairy cows (60.00%) and Kharche and Shrivastara (2007) in crossbred cows (58%). Administration of GnRH or its analogue to cattle alters function of corpus luteum (CL) and follicular dynamics by enhancing acute secretion followed by rise in circulating LH and FSH (Thatcher *et al.,* 1993). In RB cows, the GnRH treatment ensures timely ovulation followed by formation of CL for the better survival of developing embryo.

Thus reproductive performance of RB cows with delayed ovulation are benefited from GnRH treatment (Lucy and Stevenson, 1986). Higher pregnancy rate than present study was reported by More *et al.,* (2012) in RB Deoni cows (75.00%), Roy *et al.,* (1995) in bovines (73.60%) and Holtemoller (1981) in cattle (71.00%). However, comparatively lower pregnancy rate was reported by Gumen *et al.,* (2011) in lactating dairy cows (44.30%), Mehrotra *et al.,* (2015) in RB cows (32.00%), Mathew *et al.,* (2013) in crossbred RB cattle (12.50%), Kumar and Purohit (2017) in RB dairy cows (36.36%). Moreover, Tanabe *et al.,* (1994) reported non-significant effect of GnRH on conception rate in dairy cows. Inconsistent effect of GnRH on pregnancy rate among the studies might be attributed to either potency of GnRH on gonadotropin release or the time of GnRH (Mee *et al.,* 1990) and AI relative to the commencement of estrous (Stevenson *et al.,* 1984).

In Group-I, the conception rate was 33.33% in repeat breeder Gir cows. The conception rate of present study is higher than Kumar and Purohit (2017) in RB dairy cows (27.27%), whereas, lower than Senthilkumar *et al.,* (2017) in dairy cows (46.67%) and More *et al.,* (2012) in Repeat Breeder Deoni cows (50.00%). Sharma *et al.,* (2003) obtained higher (66.67%) pregnancy rate in treatment group, treated with Hydroxy Progesterone Caproate @ 500 mg, I/M on day 4 after artificial insemination as compared to control group (50%).

In a similar line, Reddy *et al.,* (2001) also observed higher (60%) conception rate in treatment group as compared to control group (26.4%). Exogenous progesterone supplementation has been shown to improve conception rates in cows when administered early in pregnancy, of course not earlier than 3 days following insemination (Turchenko, 1973, Robinson *et al.,* 1989). Corpus luteum dysfunction in dairy cattle negatively affects fertility by suppressing progesterone concentrations. In RB cows conception rate is improved when progesterone is administered during 3 to 5 days post insemination and Kimura *et al.,* (1987) recommended progesterone therapy between 4^{th} and 5^{th} day post insemination. Though, there was no improvement in conception rate in RB Gir cows, previous studies observed significant improvement of this trait. Rosen and Struman (1989) reported significant improvement of conception rate in RB cows administered with progesterone after 5-10 days of estrus through parenteral route. In another study, 53.84% conception rate has been observed by Devanathan *et al.,* (1999) in RB cows administered with 500 mg progesterone on fifth day post AI. Similarly, Srivastava and Kharche (2001) reported 65.21% conception rate in RB cows administered with 250 mg progesterone on day 5, 12 and 19 post-insemination.

Table.1 Pregnancy rates in Repeat Breeding Gir cows treated with Progesterone, GnRH, hCG and Untreated control group

Reproductive Status	Treatment Groups	No. of Cows	Conception rate (%)
Repeat Breeding Gir Cows	Progesterone (Group-I)	12	4/12 (33.33)^{ab}
	GnRH (Group- II)	12	8/12 (66.66)^{a}
	hCG (Group- III)	12	6/12 (50.00) ^{ab}
	Untreated Control (Group- IV)	12	3/12 (25.00)^{b}
	Chi-square value	48	4.99
	p-value		0.172

Note: Between Gr-II and Untreated Gr-IV significant difference: $\chi 2 = 4.99$, df=1, P=0.04.

Further, others observed 45-60% conception rate in RB cows through progesterone therapy on day 3 or 5 post AI (Singh *et al.*, 2002, Kumar *et al.*, 2011). In RB cows, progesterone supplementation may enhance conception rate by providing favourable uterine environment for better survival of embryo. Arndt *et al.*, (2009) reported fertility reduction in cattle owing to insufficient maternal luteal function and the progesterone dependent favorable uterine environment (Arndt *et al.*, (2009). Thus, lack of favourable uterine environment could result early embryonic loss in dairy cattle.

Kumar and Purohit (2017) and Mathew *et al.*, (2013) found similar conception rate (45.45% and 50.00%) in repeat breeding cattle as in present experiment in group-III. However, Senthilkumar *et al.*, (2017) and Patel *et al.*, (2010) obtained higher pregnancy rate (73.33% and 83.30%) than the present study. Paksoy and Kalkan (2010) reported 46.70% conception rate in cows supplemented with hCG on day of estrous and 12th day post insemination. Hernandezceron *et al.*, (1993) stated that conception rate of RB heifers with delayed ovulation when treated with hCG at the time of insemination was lower (26.70%) than treatment with double insemination only (34.60%) or single insemination (30.50%) without hCG treatment.

Exogenous hCG increases P_4 synthesis (Shipley *et al.*, 1988) and thus extends functional lifespan of bovine corpora lutea through luteotrophic properties (Wiltbank *et al.*, 1961). Contrary to the present findings, Breuel *et al.*, (1990) reported that a single i.m. injection of 3000 IU of hCG on day 4 after breeding did not improve conception rates in beef heifers. However, Diskin and Sreenan (1986) reported that treatment with hCG during early and mid-luteal phases generally increases peripheral progesterone concentrations, but usually does not always improve significantly the pregnancy rates. Thus, hCG therapy during post breeding period either increase (Brown *et al.*, 1973) or null effect (Hansel *et al.*, 1976, Echternkamp and Maurer, 1983) on conception.

The conception rate in group-IV was 25.00%. An apparent increase in the conception rate in GnRH and hCG treated

RB cows are socially important in India, where cow slaughter is banned in many states, besides rescuing the elite high yielding animals from involuntary culling (Mehrotra *et al.*, 2015).

Repeat Breeding condition in Gir cows could be improved by different hormonal therapies *viz.* GnRH and hCG. Hence can be used by the practicing veterinarians in repeat breeder cows to improve their reproductive efficiency and thereby the farmers economy.

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