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Augmentation of Fertility in Repeat Breeding Cows Using Modified Prostaglandin Protocol under Field Conditions

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ABSTRACT

Reproductive inefficiency of cattle due to repeat breeding syndrome is an expensive hitch in profitable dairy production and the incidence of repeat breeding is around 20-25 per cent in Uttara Kannada district of Karnataka. Present study was carried out on 30 repeat breeding cows to study the efficacy of a modified prostaglandin (PG) protocol on conception rate and its impact on estrus duration. Repeat breeding cows were selected after following proper criteria like more than three artificial inseminations with regular oestrous cycles without any signs of pregnancy. Cows were randomly assigned to two treatment groups. All selected animals were initially fed a dewormer and mineral mixture. Group I cows (n = 10) did not receive any treatment and served as control however, Group II cows (n = 20) were injected with double dose prostaglandin (20 µg Dinoprostone, Pragma®) at 11d intervals and treated with GnRH (0.02mg, Receptal®) at the time of insemination. Further, the pregnancy status was diagnosed at 45 to 60 d after insemination. The Group II animals showed proper heat signs and pregnancy rates (75.0%) were significantly ($p<0.05$) higher compared to Group I cows (30.0%). Further, 85per cent of cows treated with PG have shown the estrus duration between 24-48h compared to untreated cows (50%). Hence, use of modified PG protocol with GnRH could be appropriate method to improve fertility in repeat breeding cows under field conditions.

Key Words: Conception rate, Cows, Insemination, Prostaglandin, Repeat Breeding.

INTRODUCTION

The breeding efficiency of dairy animals is directly related to the prosperity of dairy industry. Repeat breeding is one of the important reproductive disorders in dairy cattle and results in higher economic losses in dairy herds (Katagiri, 2011). The incidences of repeat breeding have been reported varying from herd to herd however, it ranged from 5 to 30 per cent (Yusuf *et al,* 2010). The variable incidence may be attributed to the heterogeneity or multi factorial causes of repeat breedng syndrome and the effect of locality and season (Ali *et al,* 2009). However, major causes of sub-fertility caused by repeat breeding can be divided into two categories: fertilization failure and embryonic death (Amiridis *et al,* 2009). Any deviation or prolongation in the breeding rhythm results in a progressive economic loss due to widening of the dry period, reduced calving, lactations during the life span of the animal, increasing culling and replacement cost, wasting semen and insemination cost and loosing genetic gain through increased generation interval (El-Khadrawy *et al,* 2011; Osman-Ergene, 2012)

Low pregnancy rate in repeat breeding cow with delayed or an ovulatory condition may be attributed to hormonal imbalance together with uterine infection. Further, 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 use of leutinizing hormone. Administration of GnRH or hCG at the time of insemination favours LH surge, which results in improved pregnancy

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rate (Methwe *et al,* 2013). However, response to such therapy has been reported different in different animals (Sharma *et al,* 2003). During the last few years, several studies have been attempted to treat infertility in cows by using controlled internal drug release (CIDR), hormonal treatments such as gonadotropin releasing hormone (GnRH), gonadotropins (GnRH), estrogen and prostaglandin F (PGF2a) (Metwelly, 2006). Further, some of these hormones used for induction of lactation in repeat breeding cows which later showed better reproductive performance (Sharma, 2018). However, the most frequent use of these hormones in different combinations serves as an ultimate goal for improving the reproductive efficiency in cows. Likewise, numerous protocols are used in cow *e.g.,* double dose PGF2alpha at 11 days intervals and GnRH injection the time of insemination.

Under the field conditions, very fewer trials were conducted for the management of repeat breeding. Hence in the present study, efforts were made to evaluate efficacy of double dose PG protocol with combination of GnRH in enhancement of fertility in repeat breeding dairy cows under field conditions.

MATERIALS AND METHODS

Selection of experimental animals

A total of 30 healthy cyclic crossbred (Friesian x Jersey) repeat breeder cows from different villages of Sirsi and Yallapur taluka were selected randomly. Cows that were cycling normally, with no clinical abnormalities and failed to conceive after at least two successive inseminations were selected. Age of these cows ranged from 3 to 10 yr and their lactation number varied from 1 to 7. These cows were divided into two groups with 10 in first group (Group I) and 20 in second group (Group II). Normalcy of genitalia of all the animals was confirmed through rectal palpation.

Treatment and post treatment monitoring

All selected cows were initially dewormed with 3g Fenbendazole (Fentas Plus®). Further, all selected cows were fed with 40g chelated mineral mixture (Minfa Gold®) for one month. All selected repeat breeding cows were treated with 4g Cephalexin (Lixen®) intrauterine to check the infection if present in any animals. Group I cows were not treated hormonally and insemination was carried in consequent estrus cycles. However, Group II cows were injected with double dose 20 µg Dinoprostone (Pragma®) at 11d intervals and treated with 0.02mg GnRH (Receptal®) at the time of artificial insemination. Animals were examined per rectum 45 to 60d post insemination for pregnancy status. Further, most of the repeat breeding cows selected for the study were showing an abrupt estrus period (extending up to 5d). Hence, heat duration was also noted in all treated animals to confirm the effect of treatment in bringing the cows in physiological normal estrus duration. All the data were statistically analyzed by SPSS 16.0 using two way ANOVA and Chi-Square test.

RESULTS AND DISCUSSION

The conception rate and effect of treatment on duration of estrus has been depicted in Tables 1 and 2. The conception rate was significantly ($p<0.05$) higher in Group II (75.0%) cows compared to Group I (30.0%) cows (Table 1) ($\chi 2= 3.33$, $P = 0.017$). The action of PGF2a in cow with respect to control and manipulation of reproductive cycle, involves regression of corpus luteum. Further, it was reported that the prostaglandin correct uterine milieu and increases the conception rate by preventing early embryonic mortality. Further, administration of GnRH 48–60h after prostaglandin will advance the timing of the LH surge and putatively advance the timing of ovulation. Similar to the present study, Ramana *et al* (2013) and Ghuman *et al* (2012) reported conception rate of 67.0, 73.3 and 66.7 percent, respectively in repeat breeding cows treated by an injection GnRH at the time of insemination after pre-synchronization with PGF2α, which were almost nearer to the observations of the present study. However, Vijayarajan *et al* (2009) reported conception rate of 40.0 and 56.0 percent, respectively in repeat breeder

Table 1. Number of animals conceived.

Treatment	No. of animals conceived	Conception rate (%)	Chi square value
Group I (n=10)	3	30[a]	$\chi 2 = 3.333$
Group II (n=20)	15	75.00[b]	(P=0.017)

Different superscripts in coloumn (a,b) differ significantly ($p<0.05$)

cows which was lower compared to present study. The higher conception rate obtained in the present study may be due to the favourable uterine milieu and nullifying the effect of sub clinical endo metritis and delayed ovulation. Further, GnRH administered at the time of insemination may modify the function of pre ovulatory ovarian follicle, thus ensuring ovulation or it may also recruits good quality luteal cells which result into increased progesterone level and increased conception rate Justolin *et al* (2010). The present study helped in evaluating the effectiveness of PGF2α to that of GnRH to improve conception rate following timed insemination (72h) after treatment with luteolytic dose of PGF2α and to develop a management strategy to improve the conception rate of repeat breeding cross bred cows.

The effect of treatment on estrus duration in different group of cows has been depicted in (Table 2). In present study, 85 per cent of cows treated with PG have shown the estrus duration between 24-48h. However, among untreated cows (Group I) only 50 per cent cows showed estrus duration between 24-48h and remaining cows showed abrupt estrus duration extending more than 48h. Therefore, results indicates double dose PG will certainly brings the animals under normal estrus. Further, Mughal *et al* (1998) reported two-prostaglandin injection given 11d apart with insemination performed during a restricted period following the second treatment reduces the time required for oestrus detection or eliminates abrupt oestrus period.

CONCLUSION

The overall Pregnancy rate in treatment groups (75.0%) was higher compared to control group (30.0%). Further, most of the animals showed normal estrus period and it certainly correlated with higher conception rate in repeat breeding cows. From the enhanced conception rate observed in repeat breeding cows treated with a combination of PGF 2α and GnRH, it can be concluded that this therapeutic regimen can be successfully employed for improving the reproductive performance in repeat breeding cows under field conditions.

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Table 2. Duration of heat signs in different group of cows.

Treatment	Up to 18-24 h	24-48 h	>48 h
Group I (n=10)	1 (10%)	4 (40%)	5 (50%)
Group II (n=20)	11 (55%)	6 (30%)	3 (15%)

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