

EFFECT OF CONTROLLED BREEDING USING CIDR AND PGF_{2α} ON FERTILITY IN REPEAT BREEDING CROSSBRED COWS

**Rajkumar R^{1*}, Vijayarajan A², Jayaganthan P¹, Prabaharan V¹, Raja S¹
and Palanisamy M²**

¹Assistant Professor, ²Professor,
Department of Veterinary Gynaecology and Obstetrics,
Veterinary College and Research Institute,
Tamil Nadu Veterinary and Animal Sciences University,
Orathanadu – 614 625, Tamil Nadu, India
E-mail: drrajkumargr@gmail.com (*Corresponding Author)

Abstract: The present study was designed to assess the effect of CIDR and PGF_{2α} treatment on conception rate in repeat breeding crossbred Jersey cows. A total of twenty four repeat breeding crossbred Jersey cows were divided into two group containing 12 cows in each group. Cows in group I (n=12) served as control and inseminated at observed estrus. Cows in group II (n=12) treated with CIDR+PGF_{2α} and inseminated at fixed time following the treatment. The first service conception rate in CIDR+PGF_{2α} treatment group was 58.33 per cent whereas it was 33.33 per cent in control group. Thus, the CIDR based fixed time insemination protocol can be effectively used to improve the conception rate in repeat breeding cows.

Keywords: CIDR, PGF_{2α}, Fertility, Crossbred cows, Repeat Breeding.

Introduction

The success of dairy cattle husbandry lies in ensuring proper and optimal reproductive rhythm of individual female in the herd. Impairment in the normal reproductive function results into infertility and sterility leading to economic losses due to decrease in milk yield, the number of calves produced and increase in culling rate (Bartlett *et al.*, 1986). Repeat breeding is one of the major causes of infertility in dairy cattle. It has been reported that 10-24 per cent of reproductive cows in dairy farms are repeat breeders (Kimura *et al.*, 1987). Inadequate and inaccurate estrus detection is frequently a cause for cows becoming repeat breeder. Incorrect timing of artificial insemination causes poor conception rate in dairy cows. It has been reported that 15 to 20% of cows brought for artificial insemination to Veterinary Institutions are not in estrus i.e. at the luteal phase of the estrous cycle (Agarwal *et al.*, 2005). The main reasons for these errors are poor estrus detection, lack of awareness about estrus symptoms or negligence of cattle owner, subestrus or silent estrus. Repeat breeding is also caused by anovulation and delayed ovulation in dairy cows. A luteal insufficiency and lower

progesterone concentration are known to be causing early embryonic mortality and thereby lowering the conception rates in dairy cows (Villarroel *et al.*, 2004).

To increase reproductive efficiency in dairy cows, various estrus synchronization protocols using Progesterone and PGF_{2α} have been tried. Controlled breeding using Controlled Internal Drug Release Device (CIDR) and PGF_{2α} has been found to be effective in achieving good fertility in normally cycling cows (Cavalieri *et al.*, 1997). However, there are few reports available about the effect of CIDR and PGF_{2α} treatment on conception rate in repeat breeding cows (Kothandaraman and John Christy, 2017). Hence, the present study was conducted to assess the effect of controlled breeding using CIDR and PGF_{2α} on fertility in repeat breeding crossbred Jersey cows.

Material and methods

The study was conducted on 24 repeat breeding crossbred Jersey cows maintained at the Dairy farm, Veterinary College and Research Institute, Orathanadu. The body weights of the cows ranged between 300-400 kg. Cows that were free from uterine infection, gross genital tract abnormalities and having good body condition were selected for the study. The selected 24 repeat breeding cows were randomly divided into two groups containing 12 cows in each group. The selected cows were dewormed and supplemented with mineral mixture for 30 days before initiating treatment. Cows in group I (n=12) served as control and were inseminated at observed estrus. Cows in group II (n=12) were treated with CIDR and PGF_{2α}. Treatment protocol was initiated regardless of the stage of the estrous cycle of the cows. In group II cows, CIDR (EAZI-BREED CIDR[®], Pfizer Animal Health, Mumbai, India) was inserted on day 0, and 500 µg of PGF_{2α} (Pragma[®], Intas Pharmaceuticals Ltd., Ahmedabad, India) was administered on day 8 and CIDR was removed on day 9. Fixed time AI was performed at 48 and 72 hours after CIDR removal. Pregnancy diagnosis was done by rectal examination on day 60 after the fixed time artificial insemination and the first service conception rate was calculated. Animals returning to estrus were re-inseminated at the subsequent estrus and the estrous cycle length was calculated.

Results and discussion

The result revealed that the first service conception rate for cows in the control group (group I) was 33.33 per cent (4/12). Remaining eight cows returned to estrus with the mean estrous cycle length of 20.75±0.64 days in group I. The first service conception rate for cows in the CIDR+ PGF_{2α} treatment group (group II) was 58.33 per cent (7/12). Remaining five cows returned to estrus with the mean estrous cycle length of 21.40±0.61 days in group II.

All the cows treated with CIDR and PGF_{2α} expressed estrus in group II. The first service conception rate was 25.00 per cent greater in the CIDR+PGF_{2α} treatment group than in control group. Reshma *et al.* (2018) also reported higher conception rate in repeat breeding cows treated with CIDR and PGF_{2α} than in the control group (43.33 per cent versus 20.00 per cent). They found that controlled breeding using CIDR and PGF_{2α} led to increase in plasma progesterone concentration and thereby improves the conception rate in repeat breeding cows.

Kothandaraman and John Christy (2017) observed higher conception rate in repeat breeding cows treated with CIDR and PGF_{2α} (46.42 per cent) as compared to ovsynch treatment group of repeat breeding cows (33.33 per cent). They inferred that body condition scoring and managerial practices of dairy cows influence the treatment methods in a positive way. Vijayarajan and Sankar (2014) also reported first service conception rate of 76.79 per cent in CIDR and PGF_{2α} treated repeat breeding buffaloes which was higher as compared to 31.25 per cent in control group.

Lucy *et al.* (2001) and Romano and Fahning (2013) reported 53.00 per cent and 45.50 per cent conception rate respectively, in dairy cattle treated with CIDR+PGF_{2α} protocol. Honparkhe *et al.* (2011) observed first service conception rate of 52.00 per cent in repeat breeding cows treated with CIDR based protocol (PGF_{2α}+CIDR+GnRH). Mekonnin *et al.* (2016) reported 72.70 per cent conception rate in repeat breeding dairy cows using CIDR combined with PGF_{2α} and eCG.

The first service conception obtained in CIDR+PGF_{2α} treated group of the present study was comparable with Honparkhe *et al.* (2011) and Lucy *et al.* (2001). The conception obtained in the CIDR+PGF_{2α} treated group was higher than the results of Reshma *et al.* (2018) and Kothandaraman and John Christy (2017). However, the results obtained were lower than Vijayarajan and Sankar (2014) and Mekonnin *et al.* (2016). The variations in the conception rate of different workers might be due to differences in breed, climate, nutrition, management and different CIDR protocols.

The higher pregnancy rate in CIDR+PGF_{2α} treated group as compared to control group of the present study might be due to fine regulation of plasma progesterone profile during preconception period and priming of reproductive system with adequate amount of circulating progesterone during the preconception period which is favourable for the better development of preovulatory follicle that will yield a better developed corpus luteum and hence successful conception occurs subsequently (Folman *et al.*, 1990).

Plasma progesterone concentration was significantly higher in CIDR treated cows as compared to control cows on Day 1. Furthermore, plasma progesterone concentrations in CIDR treated cows remained elevated for 7 days (to the time of CIDR removal). Perhaps these elevated progesterone concentrations increased the conception rate (Kawate *et al.*, 2004).

Poor estrus detection and insemination at incorrect time is frequently a cause for cows becoming repeat breeder. Hence, the increase in conception rate of treatment group of the present study might be due to fixed time insemination using CIDR and PGF_{2α}. Repeat breeding is also caused by an ovulation, delayed ovulation and luteal insufficiency due to endocrine dysfunctions in dairy cows (Reshma *et al.* 2018). Higher conception rate reported in treatment group indicated that these endocrine dysfunctions might have been eliminated by CIDR+PGF_{2α} treatment.

Conclusion

In the present study, the first service conception rate was 25.00 per cent higher in CIDR+PGF_{2α} treatment group than in control group. Thus, conception rate in repeat breeding cows can be increased by controlled breeding using CIDR and PGF_{2α}.

Acknowledgement

Authors thank the Dean, Veterinary College and Research Institute, Orathanadu for the facilities provided.

References

- [1] Agarwal, S.K., Singh, S.K. and Rajkumar, R. (2005). Reproductive disorders and their management in cattle and buffalo: A review. *Indian J. Anim. Sci.*, 75(7): 858-873.
- [2] Bartlett, P.C., Kirk, J.H. and Mather, E.C. (1986). Repeated insemination in Michigan Holstein-Fresian cattle: Incidence, descriptive epidemiology and estimated economic impact. *Theriogenology*, 26: 309-322.
- [3] Cavalieri, J., Rubio, I., Kinder, J.E., Entwistle, K.W. and Fitzpatrick, L.A. (1997). Synchronization of estrus and ovulation and associated endocrine changes in *Bos indicus* cows. *Theriogenology*, 47(4): 801-814.
- [4] Folman, Y., Kaim, M., Herz, Z. and Rosenberg, M. (1990). Comparison of methods for the synchronization of estrous cycles in dairy cows. 2. Effects of progesterone and parity on conception. *J. Dairy Sci.*, 73: 2817-2825.

- [5] Ghuman, S.P.S., Honparkhe, M., Jagir Singh and Gandotra, V.K. (2011). Ovsynch plus CIDR based fixed time AI protocol as a therapeutic strategy in repeat-breeder crossbred dairy cattle. 81(3): 257-259.
- [6] Honparkhe, M., Ghuman, S.P.S., Singh, J.S. and Dhaliwal, G. (2011). A CIDR-based AI protocol establishes pregnancy in repeat-breeder dairy cattle. Indian J. Anim. Sci., 81(4):340-343.
- [7] Kawate, N., Itami, T., Choushi, T., Saitoh, T., Wada, T., Matsuoka, K., Uenaka, K., Tanaka, N., Yamanaka, A., Sakase, M., Tamada, H., Inaba, T and Sawada, T. (2004). Improved conception in timed-artificial insemination using a progesterone-releasing intravaginal device and Ovsynch protocol in postpartum suckled Japanese Black beef cows. Theriogenology. 61(2-3): 399-406.
- [8] Kimura, M., Nakao, T., Morigoshi, M. And Kawata, K. (1987). Luteal phase deficiency as a possible cause of repeat breeding in dairy cows. British Vet. J., 143: 560-566.
- [9] Kothandaraman, S. And John Christy, R. (2017). Comparison of efficacy of ovsynch and CIDR treatment methods in repeat breeder dairy cows. Int. J. Scientific Research in Multidisciplinary Studies, 3(11): 1-3.
- [10] Lucy, M.C., Billings, H.J., Butler, W.R., Ehnis, L.R., Fields, M.J., Kesler, D.J., Kinder, J.E., Mattos, R.C., Short, R.E., Thatcher, W.W., Wettemann, R.P., Yelich, J.V., and Hafs, H.D. (2001). Efficacy of an intravaginal progesterone insert and an injection of PGF₂ alpha for synchronizing estrus and shortening the interval to pregnancy in postpartum beef cows, peripubertal beef heifers, and dairy heifers. J. Anim. Sci., 79: 982-995.
- [11] Mekonnin, A.B., A. Forbes Howie, Christopher R. Harlow, Goitom Gidey, Desalew Tadesse Tegegne, Gidena Desta, Tadesse Gugsu, Berihu Gebrekidan, Gebregiorgis Ashebir, Simon C. Riley. (2016). Manipulation of fertility in crossbred dairy cattle using Controlled Internal Drug Release Device combined with Prostaglandin and Equine Chorionic Gonadotrophin. Animal and Veterinary Sciences, 4 (3): 39-46.
- [12] Reshma, A., Veerapandian, C., Sathiamoorthy, T., Arunmozhi, N. (2018). Relationship of plasma progesterone levels following controlled internal drug release (CIDR) insertion and conception in repeat breeder cows. J. Entomology and Zoology Studies, 6(2): 2851-2854.
- [13] Romano, J.E. and Fahning, M.L. (2013). Comparison between 7 vs 9 days of controlled internal drug release inserts permanency on oestrus performance and fertility in lactating dairy cattle. Italian J. Anim. Sci., 12: 390-394.

- [14] Vijayarajan, A. and Sankar, P. (2014). Effect of CIDR and PGF_{2α} to improve the conception rate in repeat breeding buffaloes. *Int. J. Agri. Sci & Vet. Med.*, 2(3): 132-134.
- [15] Villarroel, A., Martino, A., Bon Durant, R.H., Deletang, F. And Sischo, W.M. (2004). Effect of post insemination supplementation with PRID on pregnancy in repeat breeder Holstein cows. *Theriogenology*, 61(7): 1513-1520.