The Pharma Innovation Journal 2021; SP-10(8): 861-864

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(8): 861-864

www.thepharmajournal.com
Received: 04-06-2021
Accepted: 06-07-2021

Arun R
Assistant Professor, Veterinary Clinical Complex, Veterinary College and Research Institute, Theni, Tamil Nadu, India

K Krishnakumar
Professor and Head, Department of Animal Reproduction Gynaecology and Obstetrics, Madras Veterinary College, Chennai, Tamil Nadu, India

S Balasubramanian
Director, Directorate of Clinics, TANUVAS, Chennai, Tamil Nadu, India

Dr. H Gopi
Professor, Livestock Products Technology, College of Veterinary Science and Animal Husbandry, Jalukie, Nagaland, India

Corresponding Author
Arun R
Assistant Professor, Veterinary Clinical Complex, Veterinary College and Research Institute, Theni, Tamil Nadu, India

Mid luteal phase application of CIDR induced esturus in crossbred cows

Arun R, K Krishnakumar, S Balasubramanian and Dr. H Gopi

Abstract
Twenty healthy, parous, cyclic after day 60 post partum crossbred cows with no palpable abnormalities in the reproductive tract were selected for this study. The selected cows were randomly divided into Group I and II. Group I served as control and Group II received CIDR insert between 9 and 12 of the oestrous cycle and considered as day 0. The PGF2α was administered on day 8 after CIDR insert. Group I cows were inseminated twice at 24 h interval during natural oestrus and Group II cows were inseminated twice at 48 and 72 h with good quality frozen thawed semen after CIDR insert removal. Pattern of natural and synchronized oestrus were studied and follicle and CL diameter were measured during different phases of oestrous cycle by trans-rectal ultrasonography in both groups. Blood sample were collected during normal oestrus, day 11 and 12 of CIDR insert and 10th day of post insemination for progesterone assay. Pregnancy was confirmed on day 45 post insemination by rectal palpation and ultrasound examination. The accumulated data were analyzed statistically.

Keywords: CIDR (controled internal drug release), follicle, CL (corpus luteum)

Introduction
The dairy industry has faces numerous infertility problems which causes low milk production and conception. Efforts were made to enhance the fertility in cows with $PGF_{2\alpha}$ and GnRH/hCG in order to achieve the milk production demand in dairy industry (Schmitt *et al*., 1996) [20]. The common use of $PGF_{2\alpha}$ and GnRH/hCG in oestrus synchronization programme has improved oestrus detection rate. In Ovsynch protocol, asynchronous onset of oestrus and failure of ovulation with 1st and 2nd GnRH administration, respectively may account for reduced fertility in cows (Martinez *et al.*, 2000) [12].
Several researchers have studied the effect of Norgestomet (Thompson *et al.*, 1999) [23], MAP (Cavestany *et al.*, 2003) [4] and CIDR (Haider *et al.*, 2017) [8] to enhance fertility by overcoming the occurrence of premature oestrus in bovine. Among these, progestin-releasing devices involving protocols have been used very successfully for oestrus synchronization and Fixed Timed AI (FTAI) in cattle (Tauck *et al*., 2007) [21].

Materials and Methods
Twenty healthy, parous, cyclic crossbred cows, after 60 days postpartum, with no palpable abnormalities were selected for this study. Selected cows were randomly divided into Group I and II. Group I served as control and Group II received CIDR insert (1.38 g of progesterone) between day 9 and 12 of the oestrous cycle and day of insertion was considered as day 0. 500 µg of $PGF_{2\alpha}$ was administered intramuscularly on day 8 after CIDR insert and day 9 CIDR was removed. Group I was inseminated twice at 24 h interval during natural oestrus and Group II were inseminated twice at 48 and 72 h after CIDR removal with good quality frozen thawed semen.

Results and Discussion
The post treatment oestrus induction response in the present study revealed that all the treated cows in Group II were exhibited oestrus (100 per cent). These results were concurred with the observations of, Peterson *et al*. (2011) [14], Kasimanickam *et al*. (2012) [9] and Shahid *et al*. (2021) [17] who reported that 80 to 100 per cent of oestrus induction was achieved in cows treated with CIDR + $PGF_{2\alpha}$ + GnRH. The overall mean time taken for the onset of oestrus was 45.80 ± 0.77 h in Group II cows treated with CIDR + $PGF_{2\alpha}$. The mean duration of oestrus was 23.90 ± 0.73 h in non treated cows (Group I).

The mean duration of oestrus in Group II cows before and after oestrus induction was 23.70 ± 0.67 and 28.20 ± 4.02 h, respectively Based on the degree of manifestation of oestrus symptoms, the intensity of oestrus was classified as intense, intermediate and weak in cows (Krishnakumar, 2001) [9] and the vales were presented in The cows exhibited intense, intermediate and weak oestrus were 50, 30 and 20 per cent in Group I, and 50, 40 and 10 per cent in Group II. The mean length of the oestrous cycle in non conceived cows between the consecutive insemination immediately after treatment was 22.0 ± 0.28 days in Group I and 21.1 ± 0.16 days in Group II.

The mean Follicle diameter during natural oestrus was 09.91 ± 0.56 mm in Group I; (Fig 1 and 2) and 09.66 ± 0.81 and 12.20 ± 0.67 mm in Group II cows before and after oestrus induction. In the present study, the Follicle diameter during oestrus before induction in both the groups were found to be non significant (P>0.05). Similar observation were made by Sartori *et al*. (2001) and Perry *et al*. (2007) [13] who reported that the Follicle diameter during normal oestrus were 10 to 12.8 mm in cows. The Follicle diameter of induced oestrus in Group II (CIDR with $PGF_{2\alpha}$) was significantly larger in size (P<0.01) than Group I. The larger diameter of preovulatory follicle in Group II might be due to the cows treated with CIDR with $PGF_{2\alpha}$ helps in synchronized induction of Follicle wave emergence and influence the development of larger follicles (Hyung Kim *et al*., 2005). These, larger diameter of follicle in group II might be the application of CIDR during mid luteal phase hasten the follicular diameter.

The mean CL diameter on day 10 post insemination was 12.20 ± 0.99 mm in Group I. The diameter of CL on day 10 post insemination before and after oestrus induction with CIDR + $PGF_{2\alpha}$ treatment protocol in crossbred cows were (Fig 1 and 2) 12.3 ± 0.58 and 15.27 ± 0.98 mm in Group II. In the present study, the CL diameter in Group II treated with CIDR + $PGF_{2\alpha}$ had a larger (P<0.01) diameter of CL on day 10 post insemination than the Group I. These findings were in agreement with the observations of Cavalieri *et al*. (2004) [3] who found that the CL diameter was approximately 22 mm on day 18 after CIDR insert removal in cows. The increased diameter of CL in Group II might be due to the application of CIDR during mid luteal phase favours the greater development of CL and increased secretions of progesterone.

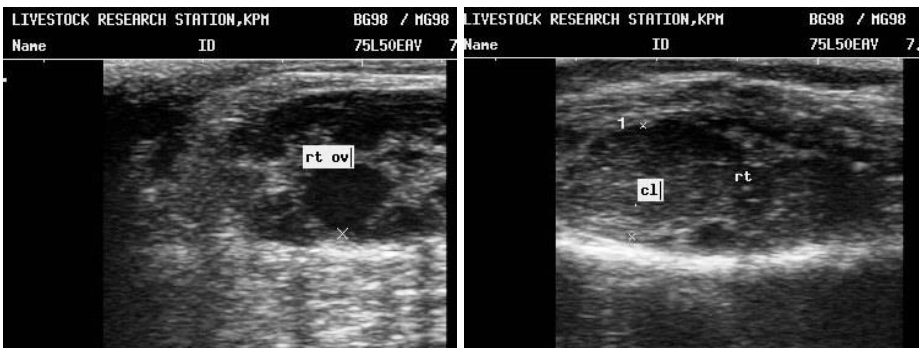
The mean serum progesterone concentration during oestrus before induction were 0.47 ± 0.14 ng/ml in Group I and 0.45 ± 0.13 ng/ml in Group II, The serum progesterone concentration among the groups before oestrus induction were found to be non significant (P>0.05). These values observed present study were in contrast with the observations of Pieterse *et al*. (1990) [15], Fricke *et al.* (1993) [5] and Marin and Espana (2007) [11] who found that the mean serum progesterone concentration were 0.30, 0.223 and 0.30 ng/ml, respectively in cows during oestrus. The reason might be the same as already cited in CL diameter as the difference between breed, body size and steroidal metabolism may exert the development of ovarian structures (Sartori *et al*., 2001) [18].

The serum progesterone concentration during induced oestrus was 0.42 ± 0.18 ng/ml in Group II. These findings observed in Group II were in accordance with Thompson *et al.* (1999) [22] who reported that the serum progesterone concentration at the time of induced oestrus was 0.49 ng/ml in cows. The serum progesterone concentration on day 10 post insemination was 3.50 ±1.80 ng/ml in Group I and , 5.11 ± 1.62 ng/ml in Group II. Among these, Group II had significantly higher (P<0.01) serum progesterone concentration on day 10 post insemination. These findings were in agreement with the observations of Saumande and Humblot (2005) [19] who reported that the mean serum progesterone concentration was 5.3 ± 0.3 and 8.2 ± 0.5 ng/ml on day 7 and 14, respectively in induced oestrus of Holstein cows.

The higher serum progesterone concentration on day 10 post insemination in Group II might be associated with ovulation of dominant and subsequent CL formation increases the progesterone concentration (Lemaster *et al*., 1999) [10].

The first and second service and over all conception rate was (Fig 3) 30.00, 14.28 and 40.00 per cent in Group I and 40.00, 50.00 and 70.00 per cent in Group II, respectively. The first and second service and overall conception rate in Group II had significantly higher (P<0.01) than Group I. Similar observations were made by Haider *et al.* (2017) [7], Bridges *et al*. (2008) [2], Gunn *et al*. (2009) [7] and Kasimanickam *et al*, (2012) [9] who reported the conception rate was 50 to 72 per cent in cows treated with by CIDR with $PGF_{2\alpha}$.

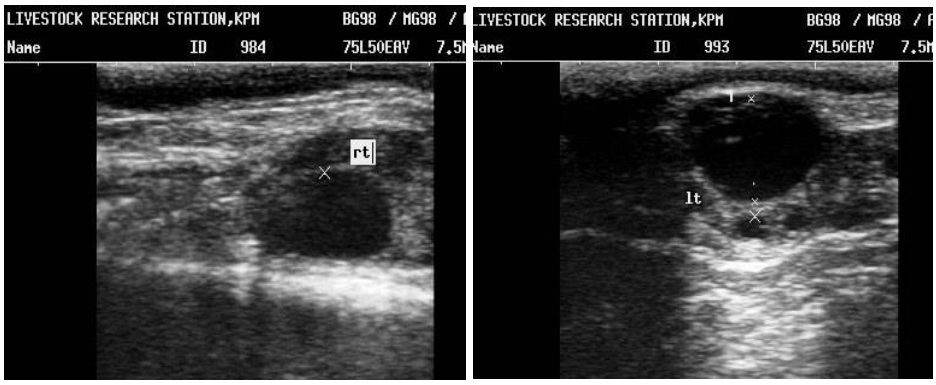
The overall conception rates in Group II was significantly higher than the Group I. These findings were in contrast to the observations of Rivera *et al.* (2005) [16], Kasimanickam *et al*. (2012) [8] and Beuchat *et al*. (2013) [1] who reported that the conception rate was 32 to 48 per cent in cows. In conclusion the possible reason for getting higher conception rate in Group II cow might be due to the application of CIDR insert during mid luteal phase results in lower concentration of progesterone during induced oestrus and elevated level of progesterone on day 10 post insemination favours increased embryonic survival and achieved a better conception rate.



A: Follicle during natural oestrus **B:** Corpus luteum during mid luteal phase

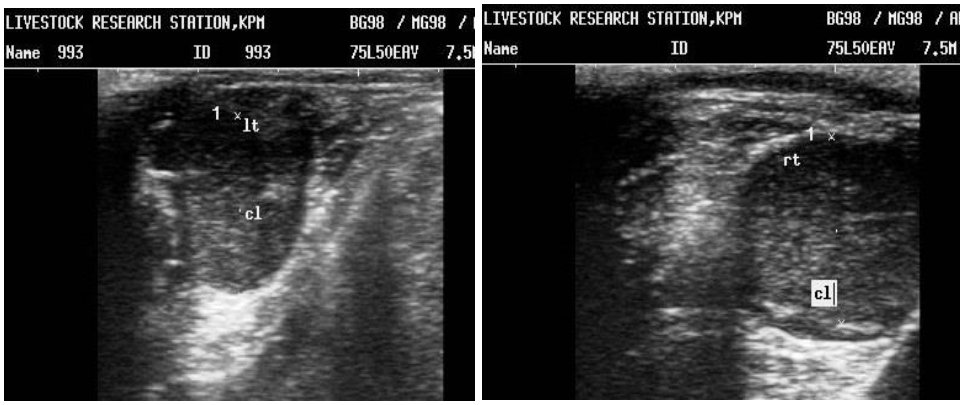
Fig 1: Ultrasonographic examination of ovarian structures in Group I

A. Follicle during oestrus



I: Before treatment **II:** After treatment

B. Corpus luteum during mid luteal phase



I: Before treatment **II:** After treatment

Fig 2: Ultrasonographic examination of ovarian structures in Group II

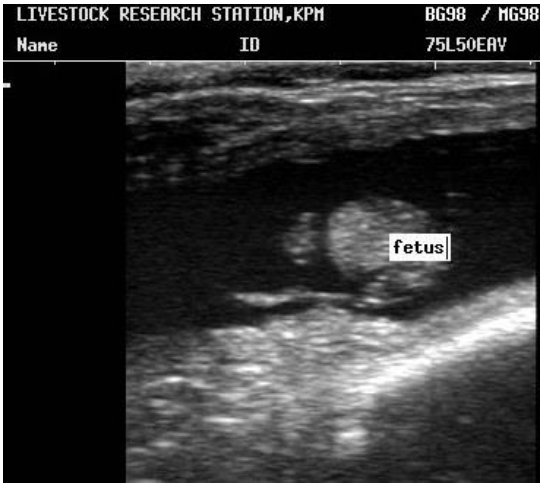


Fig 3: Ultrasonographic examination of conceptus on day 30 post insemination

Acknowledgement
We Extent our Sincere gratitude to Post Graduate Research institute, Kattupakkam and Madras Veterinary College (Tamil Nadu Veterinary and Animal Sciences University), Chennai for providing Necessary Facilities to carry out this work.

References

1. Beuchat F, Berthold P, Gerber L, Bruckmaier RM, Steiner A, Hüsler J *et al*. Conception rate using the select-synch protocol in combination with a lower dose progesterone-releasing intravaginal insert (1.38 g) in Swiss dairy cows. J Vet. Med 2013;3:6-10.
2. Bridges GA, Helser LA, Grum DE, Mussard ML, Gasser CL, Day ML. Decreasing the interval between GnRH and $PGF_{2\alpha}$ from 7 to 5 days and lengthening proestrus increases timed-AI pregnancy rates in beef cows. Theriogenology 2008;69:843-851.
3. Cavalieri J, Hepworth G, MacMillan KL. Ovarian follicle development in Holstein cows following synchronization of oestrus with oestradiol benzoate and an intravaginal progesterone releasing insert for 5 - 9 days and duration of the oestrous cycle and concentrations of progesterone following ovulation. Anim. Reprod. Sci. 2004;81:177-193.
4. Cavestany D, Meikle A, Kindhal H, Van Lier E, Moreira F, Thatcher WW *et al*. Use of medroxyprogesterone acetate (MAP) in lactating Holstein cows within an Ovsynch protocol: Follicle growth and hormonal patterns. Theriogenology 2003;59:1787-1798.
5. Fricke PM, Reynolds LP, Redmer DA. Effect of human chorionic gondotropin administratered early in the oestrous cycle on ovulation and subsequent luteal function in cows. J Anim. Sci 1993;71:1242-1246.
6. Gunn PJ, Culp KC, Lake SL, Arias RP, Lemenager RP, Heaton K *et al*. Comparison of the CIDR Select and 5 day Co-Synch + CIDR protocols for synchronizing oestrus in beef heifers. J Anim. Sci 2009;87:217 (Abstr.,).
7. Haider MS, Bilal M, Ahmed H, Anwar M, Sattar A, Andrabi SMH. Effect of CIDR with or without GnRH

and double PGF2α based estrus synchronization protocols on estrus response and pregnancy per AI in non-descript cows of the Punjab. J Anim. Plant Sci 2017;27(4):1108-1114.
8. Kasimanickam R, Asay M, Firth P, Whittier WD, Hall JB. Artificial insemination at 56 h after intravaginal progesterone device removal improved AI pregnancy rate in beef heifers synchronized with five-day Co-Synch + Controlled Internal Drug Release (CIDR) protocol. Theriogenology 2012;77:1624-1631.
9. Krishnakumar K. Effect of $PGF_{2\alpha,}$ GnRH agonist, hCG and progesterone to agument fertility in repeat breeding cows. Ph.D., Thesis submitted to Tamilnadu Veterinary and Animal Sciences University, Chennai -51 2001.
10. Lemaster JW, Yelich JV, Kempfer JR, Schrick FN. Ovulation and oestrus characteristics in crossbred Brahman heifers treated with an intravaginal progesterone-releasing insert in combination with prostaglandin $F_{2\alpha}$ and oestradiol benzoate. J Anim. Sci., 1999;77:1860-1868.
11. Marin CCP, Espana F. Oestrus expression and ovarian function in repeat breeder cows, monitored by ultrasonography and progesterone assay. Reprod. Dom. Anim 2007;42:449-456.
12. Martinez MF, Adams GP, Kastelic JP, Bergfel DR, Mapletoft RJ. Induction of follicular wave emergence for oestrus synchronization and artificial insemination in heifers. Theriogenology 2000;54:757-769.
13. Perry GA, Smith MF, Roberts AJ, MacNeil MD, Geary TW. Relationship between size of the ovulatory follicle and pregnancy success in beef heifers. J Anim. Sci 2007;85:684-689.
14. Peterson C, Alkar A, Smith S, Kerr S, Hall JB, Moore D, Kasimanickam R. Effects of one versus two doses of prostaglandin $F_{2\alpha}$ on AI pregnancy rates in a 5-day progesterone-based, Co-Synch protocol in crossbred beef heifers. Theriogenology 2011;75:1536-1542.
15. Pieterse MC, Taverne MA, Kruip TA, Willemse AH. Detection of corpora lutea and follicles in cows: A comparison of transvaginal ultrasonography and rectal palpation. Vet. Rec 1990;126:552-554.
16. Rivera H, Lopez H, Fricke MP. Use of intravaginal progesterone-releasing inserts in a synchronization protocol before timed AI and for synchronizing return to oestrus in Holstein heifers. J Dairy Sci 2005;87:2051-2061.
17. Shahid B, Khan MI, Andrabi SMH, Khan MN. Efficacy of estrus synchronization protocols in non-descript cattle of Azad Jammu and Kashmir during non-breeding and breeding seasons. The Journal of Animal & Plant Sciences 2021;31(3):657-664.
18. Sartori R, Fricke PM, Ferreira JCP, Ginther OJ, Wiltbank MC. Follicular deviation and acquisition of ovulatory capacity in bovine follicles. Biol. Reprod 2001;65:1403-1409.
19. Saumande P, Humblot P. The variability in the interval between oestrus and ovulation in cattle and its determinants. Anim. Reprod. Sci 2005;85:171-182.
20. Schmitt EJP, Diaz T, Barros CM, De La Sota RL, Dorst M, FedRiksson EW *et al*. Differential response of the luteal phase and fertility in cattle following ovulation of the first wave follicle with human chorionic gondatropin or an agonist of gondatropin – releasing hormone. J Anim. Sci 1996;74:1074-1083.
21. Tauck SA, Wilkinson JR, Olsen JR, Janitell JN, Berardinelli JG. Comparison of controlled internal drug release device and melengesterol acetate as progestin sources in an oestrus synchronization protocol for beef heifers. Theriogenology 2007;68:162-167.
22. Thompson KE, Stevenson JS, Lamb GC, Grieger DM, Loest CA. Follicular, hormonal and pregnancy responses of early postpartum suckled beef cows to GnRH, norgestomet and prostaglandin $F_{2\alpha.}$ J Anim. Sci 1999;**77**:1823-1832.