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Comparison of conception rate following CIDR ± post insemination treatment with CIDR in repeat breeder cows

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Abstract
The high incidence of Repeat breeding is one of the most common problems faced by the farmers and veterinarians in India and it causes huge economic loss to the farmers. A total of 90 repeat breeder cows that were either brought to the Teaching Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli, or to the infertility camps at nearby villages of Tirunelveli formed the experimental animals for the present study. The repeat breeder cows were randomly and equally assigned to one of the three groups. *viz*. control (Group I; n=30) CIDR (Group II; n=30) and CIDR + post AI CIDR (Group III; n=30). The pregnancy status was checked 60 to 90 days post insemination by rectal palpation. The conception rate following controlled breeding with CIDR (group II) was (P<0.05) higher at 43.33 percent than untreated cows (Group I), with CIDR and post insemination treatment with CIDR (group III) was the highest at 63.33 percent than group I & II. Hence, Controlled breeding using CIDR and $PGF_2\alpha$ in combination with post insemination CIDR therapy or alone could be used to improve the conception rate in repeat breeder cows under field conditions.

Keywords: Repeat breeder, Synchronization with CIDR, Post insemination CIDR, Conception rate

1. Introduction
In India, the most common causes of infertility or reduced fertility encountered in dairy cattle under field condition were anestrus and repeat breeding. Irrespective of the management system, repeat breeding in dairy cows remained a major cause of infertility; it led to major economic losses because of reproductive wastage, culling, replacement costs, and loss of genetic gain [1]. Among various factors associated with the occurrence of repeat breeding syndrome, asynchronous hormonal interplay was a major factor causing fertilization failure and early embryonic mortality [2]. The luteal insufficiency and lower progesterone concentration were known to be causing embryonic mortality and thereby lowering the pregnancy rates [3, 4]. Thus the main cause for repeat breeding could be attributed to hormonal asynchrony around estrus [5]. Therefore present study was undertaken in the field conditions to evaluate the efficacy of CIDR protocol with fixed time insemination in repeat breeder cows for their better conception.

2. Materials and Methods
The repeat breeder cows brought to the Teaching Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli and infertility camps at nearby villages of Tirunelveli were used. Ninety apparently healthy crossbred cows which failed to conceive in three or more consecutive inseminations with good quality semen and with Body Condition Score (BCS) of 2.5 to 3.5 were selected and randomly assigned to one of the three groups *viz*. control (Group I; n=30) CIDR (Group II; n=30) and CIDR + post AI CIDR (Group III; n=30). All the selected animals were observed for one complete estrous cycle before starting the experiment.
The cows in control group were inseminated twice at 24 h interval at the observed estrus. In the CIDR group, each cow received an intravaginal insert of CIDR from day 10 to day 19 of observed estrus and an intramuscular injection of prostaglandin $F_2\alpha$ 500 µg on day 18. All the cows were inseminated at 48 and 72 h after removal of CIDR. In the CIDR + post AI CIDR group each cow received CIDR, $PGF_2\alpha$ and insemination similar to CIDR group cows and in

addition a second CIDR was inserted on day 5 post insemination and removed on day 13. Blood samples were collected on the day of CIDR insertion and 48 h after in 10 animals of CIDR group. The pregnancy verification was carried out in all the animals by rectal palpation after 60 to 90 days post insemination. All the collected data were analyzed statistically by the method described by Snedecor and Cochran (1989) [6]. Duration of estrus was analyzed using two way ANOVA. Conception rate, intensity of estrus, lactation number and post calving interval on conception rate were analyzed using chi-square test.

3. Results and Discussion

The conception rate in repeat breeder cows in untreated control group was 20 percent. The conception rate following controlled breeding with CIDR (group II) was significantly (P<0.05) higher at 43.33 percent than that of the control group (Table 1). The conception rate recorded following controlled breeding in this study was in accordance with the conception rates reported by various authors [7, 8, 9, 10] following controlled breeding with CIDR. A higher conception rates following controlled breeding with CIDR ranging from 50 to 82.9 percent were reported in previous studies [11, 12, 13, 14, 15].The significantly higher conception rate recorded in this study following controlled breeding in repeat breeder cows could be due to the impact of fine regulation of plasma progesterone profile during preconception period [16] and priming of reproductive system with adequate amount of circulating progesterone during preconception period which was favourable for the better development of ovulatory follicles that would yield a better developed CL [17].

The conception rate in repeat breeder cows following controlled breeding with CIDR and post insemination treatment with CIDR (group III) was the highest at 63.33 percent. This was significantly higher (P<0.01) than that of untreated control cows and higher (P>0.05) than that of group II (Table 1 and Figure 1). Progesterone concentration and embryo survival was increases after supplementing progesterone using CIDR from days 3 to 8 post AI [18]. Conception rate found improved from 66.1 in untreated to 74.6 percent following CIDR insertion from 4 to 9 days after first insemination in normal cows [19]. PRID administration on day 12 to 21 after insemination improved the conception rate slightly from 49 to 54 percent [20].

The higher conception in repeat breeder cows supplemented with progesterone post AI, might be due to improved uterine environment for embryo survival and development [21] Endometrial secretions, essential for stimulating and mediating the changes in conceptus growth and differentiation throughout early pregnancy was directed by the steroid environment generated by the ovary [22]. Progesterone supplementation at the time of postovulatory rise (between day 4 and 5) has resulted in consistent increase in pregnancy rate [23].

3.1 Body Condition Score (BCS) and conception

The mean BCS was significantly (P<0.01) higher in cows that were conceived (2.96±0.06) than in those failed to conceive (2.68±0.06) (Table 2). The BCS of dairy cow is an assessment of the proportion of body fat and an important tool in dairy cattle management [24].

3.2 Duration of estrus and conception

In the present study, the mean duration of estrus in repeat breeder cows was 16.6 h and in CIDR treated cows it was 27.49 and 28.34 h in group II and III respectively. (Table.3). The mean duration of estrus recorded in untreated repeat breeder cows was within the normal range but slightly lower than the duration of 22.04 h recorded by [25] Ahmed *et al*. (2016). The mean duration of estrus following controlled breeding was more or less similar to the mean duration of 24.6±5.2 h recorded by [7] Sathiamoorthy and Kathirchelvan (2010) in postpartum cows following controlled breeding with CIDR for 9 days; There was no significant (P>0.05) difference in the duration of estrus between cows conceived and those failed to conceive.

3.3 Intensity of estrus and conception

The highest conception rates of 66.66, 61.53 and 73.68 percent were recorded among the cows which exhibited intense estrus in the groups I, II and III, respectively (Table 4, Figure 3.) In all the three groups, none of the cows which exhibited weak estrus are conceived. This was in concurrence with the previous reports, most of the CIDR treated cows showed intense estrus [7] Sathiamoorthy and Kathirchelvan (2010) and 63.64 percent of cows having intense estrus after treatment with CIDR [26].

3.4 Lactation number and conception

Overall the percentage of conception was 68.42, 58.33, 28.57 and 15.78 in first, second, third and fourth lactation cows, respectively (Table 5). Among the different groups, animals in first and second lactation had higher conception rates when compared to the cows in third and fourth lactation with a maximum of 85.71 percent in the first lactation in the group III and a minimum of 7.69 percent in the third lactation in the group I. There was a highly significant (P<0.01) difference between the lactations. The results of this study were corroborated by the reports of other authors, the conception rates declined as the lactation progressed in cows supplemented with progesterone [27]. The first and second lactation repeat breeder Holstein cows were 3.26 times more likely to become pregnant when supplemented with progesterone post insemination [4]. However, the lactation number did not affect the pregnancy rate in cows supplemented with progesterone post AI [28].

3.5 Post calving interval and conception

The overall conception rates were 64.38, 41.37 and 24.24 percent in cows with an interval of <8, 8 to 16 and >16 months after calving to the AI done in this study, respectively (Figure 2.). In all the groups the highest conception rates were recorded among cows with <8 months post calving interval and the least conception rates were recorded in cows with post calving interval of >16 months. However, no significant influence of the interval after calving on conception rate found by Kale *et al.* (1988) [29] and Haque *et al*. (2015) [30]. A longer time interval between calving to AI increased pregnancy rates in cows [31, 32]. This was in contrast to the present study, this might be explained by the fact that most cows with long calving to AI interval were dry and had minimum or no suckling resulting in higher pregnancy rate.

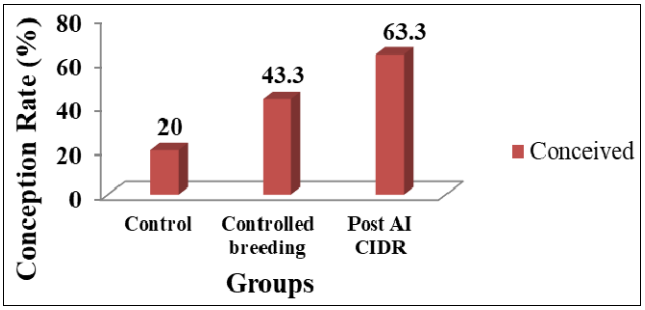

Fig 1: Conception rate in repeat breeder cows following controlled breeding with Controlled Internal Drug Release (CIDR) and post insemination treatment with CIDR in comparison with untreated cows.

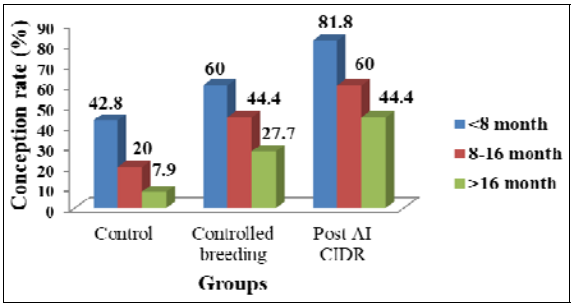

Fig 2: Influence of interval after calving on conception rate in repeat breeder cows following controlled breeding with Controlled Internal Drug Release (CIDR) and post insemination treatment with CIDR

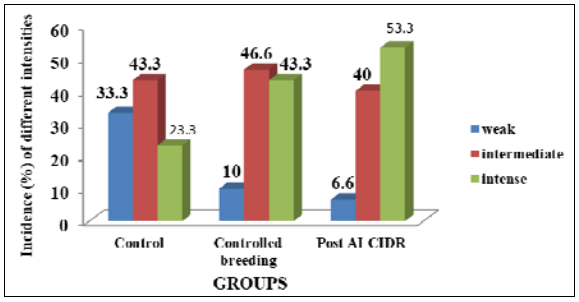

Fig 3: Intensity of estrus in repeat breeder cows following controlled breeding with Controlled Internal Drug Release (CIDR)

Table 1: Conception rate in repeat breeder cows following controlled breeding with Controlled Internal Drug Release (CIDR) and post insemination treatment along with CIDR application.

Groups	Number of cows in group	Conceived		Failed to conceive		χ^2 value	
		number	%	Number	%		
Control	30	6	20.00	24	80.00	3.774*	11.58**
Controlled breeding with CIDR	30	13	43.33	17	56.66		
Controlled breeding with CIDR + post AI CIDR	30	19	63.33	11	36.66		

*significant at (P < 0.05); ** significant at (*P*<0.01)

Table 2: Body Condition Score and conception in repeat breeder cows treated with Controlled Internal Drug Release (CIDR)

Groups	Body Condition Score (Mean ± SE)		Overall	t-value
	Conceived	Failed to conceive		
Control	2.91 ± 0.08	2.66 ± 0.05	2.71 ± 0.05	5.387**
Controlled breeding with CIDR	3.00 ± 0.08	2.70 ± 0.07	2.83 ± 0.06	
Controlled breeding with CIDR + post AI CIDR	2.97 ± 0.04	2.68 ± 0.07	2.86 ± 0.05	
Overall	2.96 ± 0.06	2.68 ± 0.06	2.8 ± 0.05	

**significant at (*P*<0.01)

Table 3: Duration of estrus (hours) in repeat breeder cows during normal cycle and following controlled breeding with Controlled Internal Drug Release (CIDR) in relation to conception.

Groups	Duration of estrus (h) (Mean ± SE)		
	Conceived	Failed to conceive	Overall
Control	17.83 ± 0.80^{b}	15.50 ± 0.40^{b}	16.66 ± 0.45^{c}
Controlled breeding with CIDR	29.69 ± 0.55^{a}	25.29 ± 0.48^{a}	27.49 ± 0.36^{b}
Controlled breeding with CIDR + Post AI CIDR	31.31 ± 0.45^{a}	25.36 ± 0.59^{a}	28.34 ± 0.37^{a}

Subclass means with different superscripts are significantly (*P*<0.01) different from each other within column

Table 4: Conception rate in repeat breeder cows following controlled breeding with Controlled Internal Drug Release (CIDR) and post insemination treatment with CIDR, in relation to intensity of estrus.

Group	Conception rate % (n)		
	Weak Estrus	Intermediate estrus	Intense Estrus
Control	0.00 (0/10)	33.33 (2/13)	66.66 (4/7)
Controlled breeding with CIDR	0.00 (0/3)	38.46 (5/14)	61.53 (8/13)
Controlled breeding with CIDR + post AI CIDR	0.00 (0/2)	26.31 (5/12)	73.68 (14/16)
Overall	0.00 (0/15)	31.57 (12/39)	68.42 (26/36)

$\chi^2 = 24.75$** significant at (P<0.01)

Table 5: Influence of number of calving on conception rate in repeat breeder cows following controlled breeding with Controlled Internal Drug Release (CIDR) and post insemination treatment with CIDR.

Group	Conception rate % (n)			
	Lactation 1	Lactation 2	Lactation 3	Lactation 4
Control	40.00 (2/5)	33.33 (2/6)	7.69 (1/13)	16.66 (1/6)
Controlled breeding with CIDR	71.42 (5/7)	57.14 (4/7)	42.85 (3/7)	11.11 (1/9)
Controlled breeding with CIDR + post AI CIDR	85.71 (6/7)	72.72 (8/11)	50.00 (4/8)	25.00 (1/4)
Overall	68.42 (13/19)	58.33 (14/24)	28.57 (8/28)	15.78 (3/19)

χ^2=11.66** significant at (P < 0.01)

4. Conclusion

It could be concluded from the present study that controlled breeding using CIDR in combination with post insemination CIDR could be used to improve the conception rate in repeat breeder cows under field conditions.

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6. References

1. Bartlett PC, Kirk JH and Mather EC. Repeated insemination in Michigan Holstein-Friesian cattle: Incidence, descriptive epidemiology and estimated economic impact. Theriogenology. 1986; 26(3):309-322.
2. Singh RB, Sharma RD and Singh GB. Incidence of repeat breeding in cows and buffaloes. Indian Journal of Dairy Science. 1986; 36:314-315.
3. Shams-Esfanabadi N, Shirazi A. Effects of supplementation of repeat-breeder dairy cows with CIDR from 5−19 post insemination on pregnancy rate. Pakistan Journal of Biological Sciences. 2006; 9(11):2173-2176.
4. Villarroel A, Martino A, BonDurant RH, Deletang F, Sischo WM. Effect of post insemination supplementation with PRID on pregnancy in repeat breeder Holstein cows. Theriogenology. 2004; 61(7):1513-1520.
5. Bage R, Gustafsson H, Larsson B, Forsberg M, Rodrıguez-Martınez H. Repeat breeding in dairy heifers: follicular dynamics and estrous cycle characteristics in relation to sexual hormone patterns. Theriogenology. 2002; 57(9):2257-2269.
6. Snedecor GW and Cochran WG. Analysis of variance: the random effects model. Statistical Methods. Iowa State University Press, Ames, IA, 1989, 237-252.
7. Sathiamoorthy T, Kathirchelvan M. Efficacy of $PGF_2\alpha$, CIDR and Ovsynch treatment on oestrus response and fertility rate in crossbred cows. Indian Journal of Animal Reproduction. 2010; 31:43-45.
8. Jyothi K, Naidu KV, Bramhaiah KV, Padmaja K. An evaluation of different estrus synchronization protocols on fertility in postpartum crossbred cows. Theriogenology. 2012; 2(3):153-157.
9. Romano JE, Fahning ML. Comparison between 7 vs. 9 days of Controlled Internal Drug Release inserts permanency on estrus performance and fertility in lactating dairy cattle. Italian Journal of Animal Science. 2013; 12(3):63.
10. Hadiya K, Dhami A, Nakrani B, Lunagariya P. Estrus induction, follicular dynamics and fertility response to mid-cycle $PGF_2\alpha$, CIDR and ovsynch protocols in subfertile Gir and crossbred cows. The Indian Journal of Animal Reproduction, 2015, 36(1).
11. Ramakrishnan A, Dhami AJ, Naikoo M, Parmar BC, Divekar BS. Estrus induction and fertility response in postpartum anestrus Gir cows. The Indian Journal of Animal Reproduction, 2012, 33(1).
12. Vijayarajan A, Meenakshisundaram S. Effect of CIDR and $PGF_2\alpha$ to augment fertility in repeat breeding Holstein Friesian crossbred cows. The Indian Journal of Animal Reproduction, 2014, 34(1).
13. Thomas JM, Bishop BE, Abel JM, Ellersieck MR, Smith MF, Patterson DJ. The 9-d CIDR-PG protocol: Incorporation of prostaglandin $F_2\alpha$ pretreatment into a long-term progestin based estrus synchronization protocol for postpartum beef cows. Theriogenology. 2016; 85:1555-1561.
14. Parmar BN, Patel DM, Vijyeta HP, Parikh SS. Controlled Breeding Techniques for Enhancing Reproductive Performance of Buffaloes. The Indian Veterinary Journal. 2017; 94 (5):33-35.
15. Achi NP, Rekwot PI, Barje PP, Abubakar YU. Estrus synchonization in Friesian X Bunaji and Bunaji Cows treated with Controlled Internal Drug Release (CIDR-B) Journal of Animal Production and Research. 2015; 27:27-35.
16. Honparkhe M, Ghuman SPS, Singh J, Dhaliwal GS. A CIDR-based AI protocol establishes pregnancy in repeat-breeder dairy cattle. Indian Journal of Animal Sciences. 2011; 81(4):340.
17. Folman Y, Kaim M, Herz Z, Rosenberg M. Comparison of methods for the synchronization of estrous cycles in dairy cows. 2. Effects of progesterone and parity on conception. Journal of Dairy Science. 1990; 73:2817-2825.
18. Beltman ME, Lonergan P, Diskin MG, Roche JF, Crowe MA. Effect of progesterone supplementation in the first week post conception on embryo survival in beef heifers. Theriogenology. 2009; 71:1173-1179.
19. Stevenson JS, Portaluppi MA, Tenhouse DE, Lloyd A, Eborn DR, Kacuba S *et al*. Interventions after artificial insemination: conception rates, pregnancy survival, and ovarian responses to gonadotropin-releasing hormone, human chorionic gonadotropin, and progesterone. Journal of Dairy Science. 2007; 90(1):331-340.
20. Folman Y, Kaim M, Herz Z, Rosenberg M. Reproductive Management of Dairy Cattle Based on Synchronization of Estrous Cycles. Journal of Dairy Science. 1984; 67(1):153-160.
21. Balakrishnan M, Bhaskar BV, Chinnaiya GP, Arora VK, Ramu A, Sharma TA. Progesterone supplementation and pregnancy rate receipt cross bred cattle. Indian Journal of Animal Reproduction. 1994; 15:94-97.
22. Wilmut I, Saleb DE, Ashworth CJ. Maternal and embryonic factors associated with prenatal loss. Reproduction. 1986; 75:851-864.
23. Mann GE, Fray MD, Lamming GE. Effects of time of progesterone supplementation on embryo development

and interferon- tau production in the cow. The Veterinary Journal. 2006; 171:500-503.
24. Roche JR, Friggens NC, Kay JK, Fisher MW, Stafford KJ and Berry DP. Invited review: Body condition score and its association with dairy cow productivity, health and welfare. Journal of Dairy Science. 2009; 92(12):5769-5801.
25. Ahmed N, Kathiresan D, Ahmed FA, Lalrintluanga K, Mayengbamand P, Gali JM. Pattern of induced estrus and conception rate following Ovsynch and Ovsynch based gonadotropin-releasing hormone treatments initiated on day 6 of estrous cycle in repeat breeding crossbred cows. Veterinary World. 2016; 9(4):342.
26. Murugavel K, Antoine D, Raju MS. Effect of eCG on fertility in CIDR treated anestrous cows. The Indian Veterinary Journal. 2010; 87(7):670-672.
27. Herriek JB. Clinical observations of progesterone therapy in repeat breeding heifers. Veterinary Medicine. 1953; 48:489.
28. Ababneh MM, Alnimerand MA, Husein MQ. Effect of post insemination progesterone supplement on pregnancy rates of repeat breeder friesian cows. Asian Australian Journal of Animal Sciences. 2007; 20(11):1670.
29. Kale EM, Pachpute ST, Patil RR, Jagtap DZ. Survivability, calving and conception rate of dairy herd livestock adviser.The Indian Veterinary Journal. 1988; 13:5-7.
30. Haque MN, Gofur MR, Asaduzzaman KM, Bhuiyan MMU. Factors limiting the pregnancy rates in artificially inseminated cows in Bangladesh. International Journal of Dairy Science. 2015; 10:278-287.
31. Carlos A. Managing the postpartum cow to maximize pregnancy rates. Journal of Animal Science. 2004; 76:653-678.
32. Tibbo K, Wiener G, Fielding D. A review of the performance of Jersey breed of cattle and its crosses in the tropics in relation to the Friesian or Holstein and indigenous breeds. Animal Breed. 1994; 10:719-726.