ECRONICON OPEN ACCESS

EC VETERINARY SCIENCE
Research Article

CIDR Based Hormonal Protocols Effect Upon Fertility in Anestrous Cows at the Farm of National Cattle Research Programme, Rampur, Chitwan

A K Sah[1]*, G Gautam[2], L R Pathak[3] and Y R Pandeya[4]

[1]*National Buffalo Research Programme/NARC, Nepal*
[2]*Department of Theriogenology/AFU, Nepal*
[3]*Animal Breeding Division/NARC, Nepal*
[4]*National Cattle Research Programme/NARC, Nepal*

***Corresponding Author:** A K Sah, National Buffalo Research Programme/NARC, Nepal.

Received: August 29, 2019; **Published:** January 30, 2020

Abstract

Three CIDR based hormonal protocols (CoSynch + CIDR, OvSynch + CIDR and CIDR + PGF2α) were applied to 25 Jersey crosses (N = 13) and Holstein crosses (N = 12) anestrous cows to improve the fertility at the farm of National Cattle Research Program, Rampur, Chitwan in the year 2017/18. All three protocols were found equally effective with 100% estrus expression rate at P>.05, out of which, 80% (8/10), 85.7% (6/7) and 75% (6/8) had prominent estrus expression at the time of artificial insemination in CoSynch + CIDR, OvSynch + CIDR and CIDR + PGF2α protocols respectively and rest had non-prominent estrus expression (with partial cervix open). However, the conception rate was low in all groups as the anoestrus cows might not only have hormonal problem but also have various other reasons which was beyond the objective of this research. One cow each in CIDR+PGF2α group and OvSynch group were conceived while none in CoSynch + CIDR group which were statistically non-significant (P > .05). This study concludes that although anestrous cows respond well to the CIDR based hormonal protocols to revive the estrus but the reason for poor conception rate need yet further studies.

Keywords: *CIDR; Estrus; Conception; Anestrous*

Introduction

Reproductive efficiency is dependent upon optimization of management, health and physiology of cows [1,2]. It is important that cows become pregnant at a biologically optimal time and produces offspring at defined calving interval [3], otherwise leads to Infertility or Subfertility. Major physiological aspects that affect fertility in dairy cows are behavioral estrus or physiological anestrous, timely ovulation, quality semen and oocytes, uterine environment, maternal recognition of pregnancy, release time and concentration of progesterone and negative energy balance [4,5].

Anestrus condition is characterized by absence of estrus behavior [6]. During postpartum period negative energy balance may cause anovulation which leads to physiological anestrous [7]. It is obvious for the most of the cows to remain in anestrous during 10 to 12 weeks postpartum due to state of negative energy balance and thereafter animal may be cyclic but again due to incompetent oocytes, smaller dominant follicle, abnormal progesterone profiles and poor embryo survival may affect the fertility [6].

Cows having concentrations of progesterone < 1.0 ng/ml in both of the first 2 blood samples at least 10 days apart were classified as anestrous [8]. Adams GP., *et al.* [9] reported that oocytes that developed under a prolonged-low-progesterone level (i.e. mimicking persistent oversized follicles) failed to ovulate. Hence, it can be regarded as progesterone hormone has significant role in the estrus expression and ovulation in the dairy cows.

This research work focuses on the management of anestrous cows through application of hormonal approach.

Increased progesterone (P4) during the growth of follicular wave increases fertility more than 10% to the subsequent timed AI. Also, many manipulative studies have reported improvement in ~ 5 - 7% pregnancy using CIDR in OvSynch hormonal protocol prior to artificial insemination [10] and similarly 10% more pregnancy with co-synch protocol alone [11].

A new reproductive tool-the CIDR (controlled internal drug release) was approved by Food and Drug Administration in 2002 for the synchronization of estrus. The CIDR, an intra-vaginal progesterone insert can be used in conjunction with PG [12].

Objective of the Study

Hence the objective of this experiment was to apply the CIDR as a source of progesterone hormone with various protocols upon prolonged anestrous cows for their effect on estrus expression and pregnancy rate following fixed timed artificial insemination.

Methodology

25 crossbred anestrous (heat not expressed for at least last six months) Jersey Cross (N = 13) and Holstein Cross (12) cows were selected from the farm of National Cattle Research Programme, Rampur, Chitwan in the year 2017/18. Parity of selected cows was in between 1 to 4 and milk yield less than two liters or zero per day per cow. Selected cows were applied to three different CIDR based hormonal estrus synchronization protocols. Hormones used in the protocols were progesterone; gonadotropin releasing hormone (GnRH) and prostaglandin (PGF2α). Eazi-Breed CIDR® cattle devices each of 1.9 gram was used as a source of progesterone which was intra-vaginally inserted, Cloprochem 0.025% (Cloprostenol) as a prostaglandin analogue was used at the rate of 2 ml intramuscularly and Gynarich (Busereline 4mcg/ml) as a source of GnRH at the rate of 2.5 ml were used as shown in the protocols.

Protocol I: OvSynch+CIDR (Number of anestrous cows N =7).

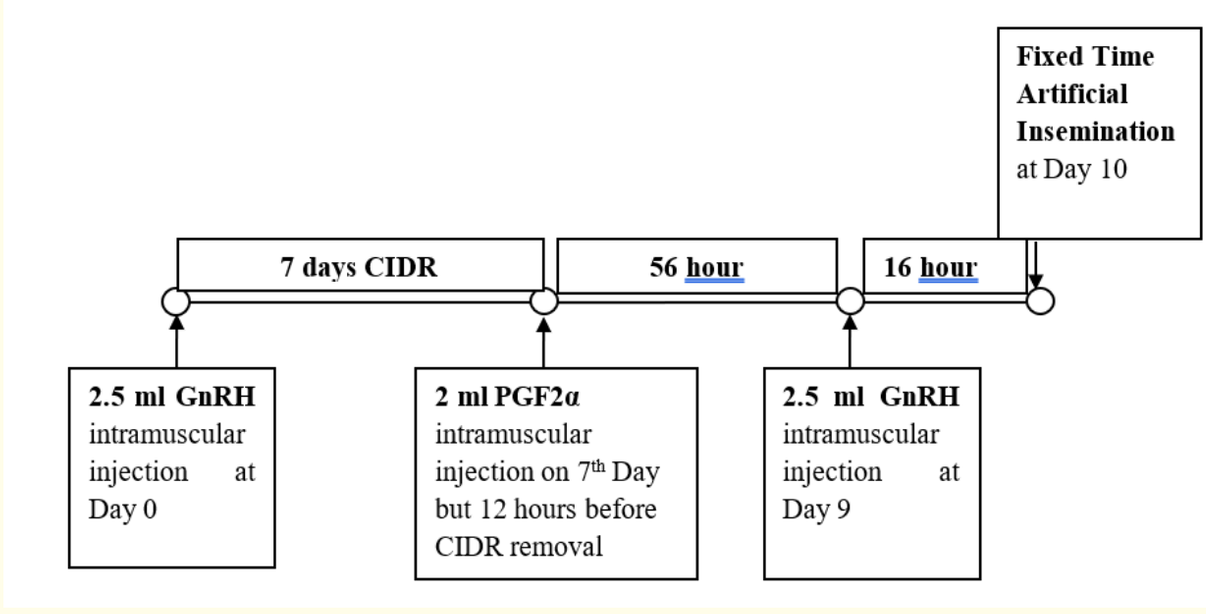

Figure 1: *Ovsynch + CIDR protocol.*

Protocol II: CoSynch+CIDR (Number of anestrous cows N=10).

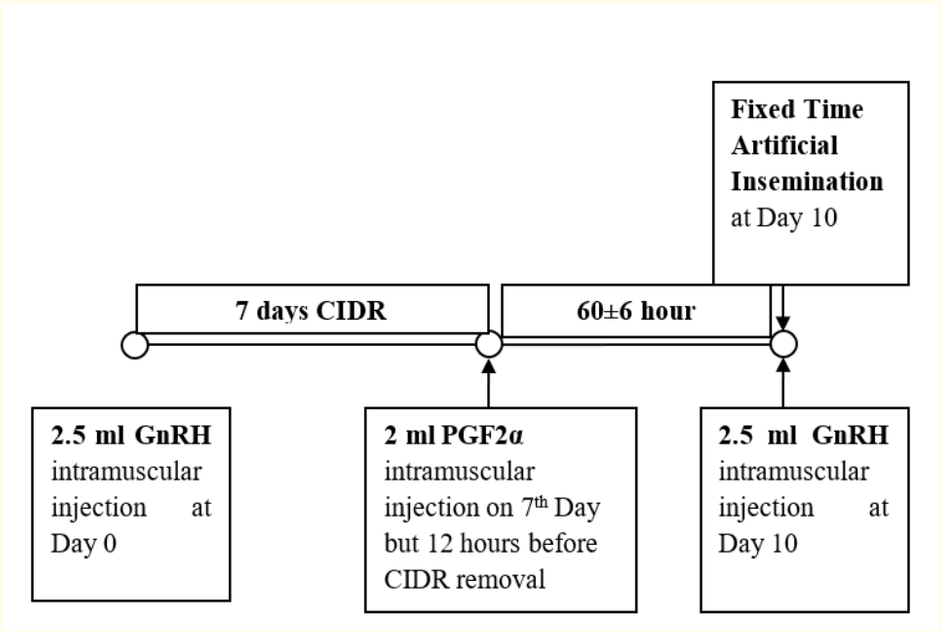

Figure 2: *CoSynch + CIDR estrus synchronization protocol.*

Protocol III: CIDR insert for 10 days + PGF2α (Number of anestrous cows N = 8).

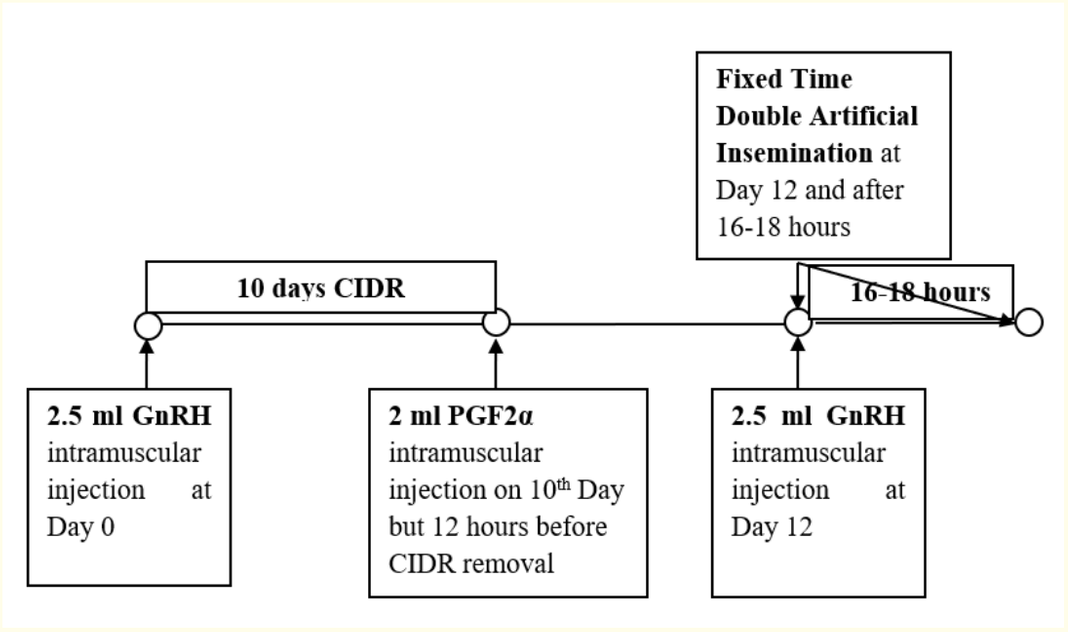

Figure 3: *CIDR insert for 10 days + PGF2α estrus synchronization protocol.*

Fixed time artificial insemination was done in cows of all groups as mentioned in the protocols where protocol III received double fixed time artificial insemination.

Estrus expression signs like mucus discharge, swollen vulva, pinkish vaginal mucus membrane and status of cervix (well open or partial open) at the time of artificial insemination was observed and recorded accordingly. On the basis of estrus expression behavior estrus expression response due to the various protocols were divided into two categories namely well cervix open with other one of the estrus signs as prominent estrus expression and partial cervix open with other one of the estrus signs as non-prominent estrus expression.

Pregnancy Diagnosis was done after 60 days post artificial insemination and recorded as positive and negative results for all the cows under experiment.

Data on the pregnancy outcome and estrus expression outcomes were entered in the IBM SPSS version 20 and applied Fisher's exact test to find the association of pregnancy outcome and estrus expression outcome with respect to various hormonal protocols. Data of pregnancy outcomes and estrus expression were analyzed at the confidence interval (CI) 95% and significance value P = 0.05.

Results

Response of different hormonal protocols on estrus expression

100% estrus expression observed by the time of Fixed time AI in all protocols. However, there were only 80.0%, 85.71% and 75.0% prominent estrus expression that is estrus signs with well cervix open at the time of fixed time artificial insemination in CoSynch + CIDR, OvSynch + CIDR and CIDR + PGF2α protocols respectively as shown in figure 4. Estrus expression were statistically non-significant (P > 0.05) among all the protocols applied.

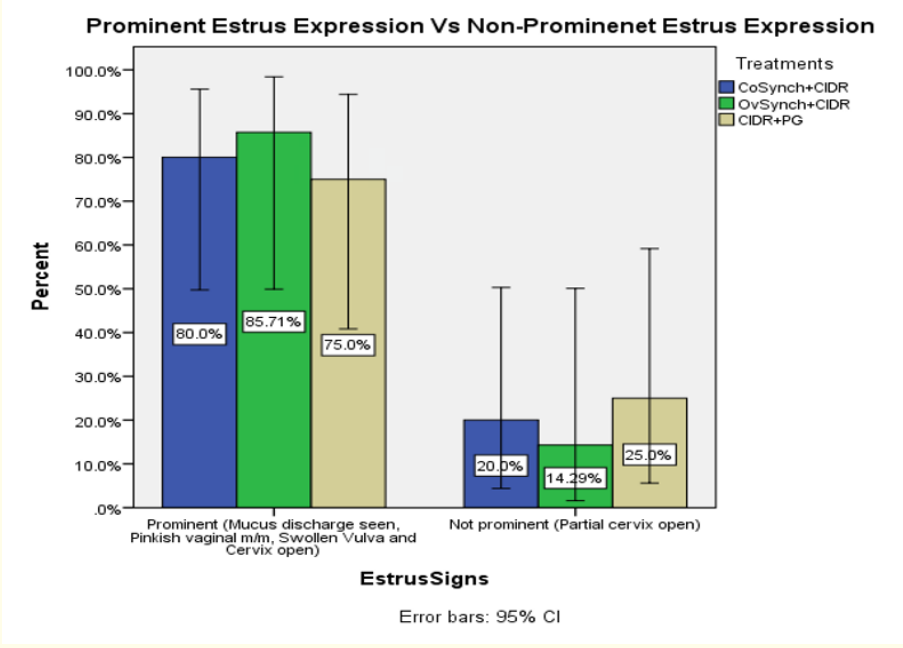

Figure 4: *Estrus expression percentages in buffalo with three different CIDR based estrus synchronization protocols.*

Response of different hormonal protocols on pregnancy outcomes

Very poor results were found following the fixed time artificial insemination buffaloes of all protocols with only 14.3% in OvSynch + CIDR protocol followed by 12.5% in CIDR + PGF2α and with no pregnancy in CoSynch + CIDR as shown in table 1. The results of pregnancy outcomes were found to be non-significant (P > 0.05) with respect to three protocols applied in the experiment.

CIDR Based Hormonal Protocols	Pregnancy Outcome (%)
Protocol I: CoSynch + CIDR (N=10)	0
Protocol II: OvSynch +CIDR (N=7)	14.3
Protocol III: CIDR + PGF2α (N=8)	12.5
	P > 0.05 (Non-significant)

Table 1: *Pregnancy outcomes due to three different CIDR based synchronization protocols 1.*

Discussion

Result of 100% estrus expression is found to be consistent with the results reported by Dhami., *et al.* [13], V Kumaravel and S Sendur Kumaran [14] but in contrast to other reports like Chebel., *et al.* [8], Kalwar Q., *et al.* [15] where 30 and76.47% estrus expressions were reported respectively. After progesterone withdrawal, anestrous cows experience increased pulse frequency and mean concentrations of LH, increased numbers of LH receptors in the granulosa and theca cells of follicles [16] there by increased estradiol production by the follicles and an estradiol-stimulated LH surge and ovulation [17,18].

Poor pregnancy outcome rate in this research work is not in agreement with most of the studies where at least 26% pregnancy rate by CIDR + PGF2α protocol was reported by Lucy., *et al.* [1] to higher conception rates like 52.94% in OvSynch + CIDR [15], 53.33% by Kumaravel and Kumaran [14] and conception has been reported up to 80% in CoSynch + CIDR by A J Dhami., *et al* [13].

High progesterone near at the time of fixed time artificial insemination also leads to decreased fertility [10] as high progesterone produces incompetence oocyte whereby poor fertilization or poor embryo quality production and finally reduced pregnancy which could have happen with this experiment work. Hence, in such researches hormonal assay of progesterone, FSH, Estradiol and LH is also required to correlate and interpret the results in a more precise way. Besides, conception is governed by many factors like semen quality, maternal recognition pregnancy, early embryonic deaths etc. and which were beyond the objective of this research work.

Conclusion

CIDR based protocols OvSynch + CIDR, CoSynch + CIDR and CIDR + PGF2α are equally effective in estrus induction of anestrous dairy cows with poor pregnancy outcome where reason for poor conception rate yet need further research.

Acknowledgement

Nepal Agricultural Research Council/Government of Nepal.

Bibliography

1. Lucy MC. "Reproductive physiology and management of high-yielding dairy cattle". *Proceedings of the New Zealand Society of Animal Production* 61 (2001): 120-127.

2. Sartori R., *et al*. "Factors affecting fertilisation and early embryo quality in single- and superovulated dairy cattle". *Reproduction, Fertility and Development* 22.1 (2010): 151-158.

3. Sakaguchi M. "Practical aspects of the fertility of dairy cattle". *Journal of Reproduction and Development* 57.1 (2011): 17-33.

4. Lucy MC. "Fertility in high-producing dairy cows: reasons for decline and corrective strategies for sustainable improvement". *Society for Reproduction and Fertility* 64 (2007): 237-254.

5. Walsh S W., *et al*. "A review of the causes of poor fertility in high milk producing dairy cows". *Animal Reproduction Science* 123.3-4 (2011): 127-138.

6. Peter AT., *et al*. "Postpartum anestrus in dairy cattle". *Theriogenology* 71.9 (2009): 1333-1342.

7. Kumar PR., *et al*. "Anestrus in Cattle and Buffalo: Indian Perspective". *Advances in Animal and Veterinary Sciences* 2.3 (2014): 124-138.

8. Chebel R C., *et al*. "Reproduction in dairy cows following progesterone insert presynchronization and resynchronization protocols". *Journal of Dairy Science* 89.11 (2006): 4205-4219.

9. Adams GP., *et al*. "Progress in understanding ovarian follicular dynamics in cattle". *Therigenology* 69.1 (2008) 72-80.

10. Wiltbank M C., *et al*. "Positive and negative effects of progesterone during timed AI protocols in lactating dairy cattle". *Animal Reproduction Science* 9.3 (2012): 231-241.

11. Lamb GC., *et al*. "Inclusion of an intravaginal progesterone insert plus GnRH and prostaglandin F2α for ovulation control in postpartum suckled beef cows". *Journal of Animal Science* 79.9 (2001):2253-2259.

12. Darrel JK. "Review of estrous syncrhonization systems: CIDR inserts". *Proceedings: the Applied Reproductive Strategies in Beef Cattle Workshop* 5-6 (2002).

13. Dhami AJ., *et al*. "Comparative efficacy of different estrus synchronization protocols on estrus induction response, fertility and plasma progesterone and biochemical profile in crossbred anestrus cows". *Veterinary World* 8.11 (2015): 1310-1316.

14. Kumaravel V and Kumaran SS. "Estrus synchronization in crossbred dairy cows under field conditions". *International Journal of Applied and Pure Science and Agriculture* 3.8 (2017): 2394-5532.

15. Kalwar Q., *et al*. "Estrus response and fertility rate in Kundhi buffaloes following estrus synchronization in breeding season". *Journal of Advanced Veterinary and Animal Research* 2.3 (2015): 362-365.

16. Inskeep EK., *et al*. "Receptors for Luteinizing Hormone and Follicle-Stimulating Hormone in Largest Follicles of Postpartum Beef Cows". *Biology of Reproduction* 38.3 (1988): 587-591.

17. Rhodes FM., *et al*. American Dairy Science Association, 2003. "Invited Review: Treatment of Cows with an Extended Postpartum Anestrous Interval". *Journal of Dairy Science* 86.6 (2003): 1876-1894.

18. Gumen A and Wiltbank MC. "Follicular cysts occur after a normal estradiol-induced GnRH/LH surge if the corpus hemorrhagicum is removed". *Reproduction* 129.6 (2005): 737-745.

Volume 5 Issue 2 February 2020