

FERTILITY IMPROVEMENT BY PRESYNCH PROTOCOL IN POSTPARTUM DAIRY COWS

Hirole, P.D., Deshmukh S.G., Ingawale M.V., Thorat M.G., Kuralkar S.V. and
Ratnaparkhi A.R.

Department of Animal Reproduction, Gynaecology and Obstetrics
Post Graduate Institute of Veterinary and Animal Science, Akola
E-mail: dr.sgdeshmukh@rediffmail.com

Abstract: The study was undertaken to find out the efficacy of Presynch protocol in terms of estrus induction and conception rate in postpartum dairy cows. Total twelve dairy cows with 40-60 postpartum days cyclic cows from 2nd to 4th lactation were selected. All selected cows were divided into two groups comprising six cows in each group. In Group-I cows received Presynch protocol and fixed timed A.I. at 18 to 20 hrs. was carried out. In Group-II cows were kept as untreated and inseminated after detected estrus. The first service conception rate was recorded on day 60 post insemination. The percent induced estrus response recorded in Presynch group was 83.33 and control group 66.66 percent within 110 days postpartum, respectively. The first service conception rate was observed in Presynch and control group were 50 and 25%, respectively. The first service conception rate was observed higher in Presynch group than control group. The mean haemoglobin level on day of estrus observed in study was significantly higher ($P < 0.05$) as compared to day 0. The mean packed cell volume percentage and DLC count showed non-significant difference at different time interval while eosinophil count showed significant decreased ($P < 0.05$) at the time of estrus as compared to day of selection (day 0). The mean serum calcium, phosphorus and total protein level showed non-significant difference but increases numerically after '0' day, whereas the mean serum BUN level showed non-significant difference at different time interval but decreases numerically after '0' day.

Keywords: Estrus synchronization, Postpartum cows, Presynch, Estrus induction, Conception rate.

Introduction

The success of Ovsynch protocol depends on the period of the cycle at the beginning of the application. It has been observed that when it is applied between the 5th and 12th day of the cycle (early luteal phase), fertility increases and the pregnancy rate is higher (Vasconcelos *et al.*, 1999; Moreira *et al.*, 2000b; Moreira *et al.*, 2001). Therefore, application of PGF2 α in cows twice with an interval of 14 days prior to Ovsynch protocol ensures the application of Ovsynch on the days in question at a rate of more than 70 %. This method is called "Presynch-Ovsynch" (Akoz *et al.*, 2008; El-Zarkouny *et al.*, 2004; Navanukraw *et al.*, 2004). A Presynch protocol is desirable because it presynchronizes the estrus cycles, so when the

timed A.I. protocol is initiated, the majority of cows are between Days 5 and 12 of the estrus cycle, an ideal time to start the timed A.I. protocol to maximize fertility. A contributing factor to this improved fertility is the greater proportion of cows that ovulate in response to their first GnRH injection of Ovsynch. (Stevenson *et al.*, 2017).

Calcium and phosphorus are the important minerals, deficiency of which may upset the proper functioning of reproductive organs. Similarly the reproductive performance is inversely related to Ca: P ratio and dietary phosphorus intake. Hence, the present investigation was carried out to study the estrus induction and conception rate in 12 postpartum dairy cows treated with Presynch protocol.

Material and Methods

The present study was conducted on 12 postpartum dairy cows from 40-60 days postpartum at Livestock Instructional Farm PDKV, Akola and Gorakshan Sanstha, Gorakshan road, Akola and Department of Animal Reproduction, Gynaecology and Obstetrics, Post Graduate Institute of Veterinary and Animal sciences, Akola, Maharashtra. All these cows had good body condition score, normal genitalia and cyclic cows from 2nd to 4th lactation. Heat detection was done by visual observations in the morning 7.00 a.m. and evening 6.00 p.m.

Treatment Procedure

The selected dairy cows were treated with injection Ivermectin @ 1 ml per 50 Kg body weight s/c (only once), injection vitamin AD₃EH 5 ml I/M (5 days apart), injection Sodium Acid Phosphate 40.3% w/v per ml @ 5 ml I/M (5 days apart), chelated mineral mixture 50 gm daily orally for 10 days. After initial treatment these cows were randomly divided into two groups comprising six cows.

Group I (Presynch)

Cows in this group were received two injections of PGF₂ α (500 μ g Cloprostenol) 14 days apart (day 0-PGF₂ α , day 14- PGF₂ α), inj. GnRH (10 ug Buserlin Acetate) after 12 days of second PGF₂ α injection (day 26-GnRH), inj. PGF₂ α after 7 days of GnRH (day 33- PGF₂ α), inj. GnRH after 48 hrs (day 35-GnRH) and fixed timed A.I. done after 18 to 20 hrs.

Group II (Control)

Cows in control group were received initial treatment with injection Ivermectin @ 1 ml per 50 kg body weight s/c (only once), injection vitamin AD₃EH 5 ml I/M (5 days apart), injection Sodium acid phosphate 40.3% w/v per ml @ 5 ml I/M (5 days apart), chelated mineral mixture 50 gm daily orally for 10 days and inseminated after detected estrus.

The induced estrus response was calculated on the basis of number of cows responded (exhibited estrus symptoms) after $\text{PGF}_2\alpha$ injection during presynch protocol. For haematological and biochemical analysis, blood was collected on the day of selection of animal, on day of start of synchronization treatment (10th day) and on the day of estrus. Haemoglobin was estimated by using Sahli's haemometer method and expressed in gm/dl while packed cell volume (PCV) was observed by using microhaematocrit scale and expressed in percent. The serum total protein, calcium, phosphorus and blood urea nitrogen (BUN) were estimated on semi-autoanalyser (Autochem 2011) using Span Diagnostic kits. Statistical analysis was carried out by using Complete Randomized Design (CRD) using statistically Web Based Agricultural Statistics Software Package (WASP 2.0).

Results and Discussion

The number of cows responded to treatment in Presynch group was 5 out of 6 (83.33 %) within 91.4 postpartum days and 4 cows out of 6 exhibited spontaneous estrus from control group (66.66%) within 110 postpartum days (Table 1). From the study it was observed that the efficiency in terms of estrus response was higher in Presynch protocols as compare to spontaneous estrus i.e. control group. The estrus response with Presynch protocol in present study are in accordance with Navanukraw *et al.*; 2004 and Gumen *et al.*; 2012 who reported 81.1% and 85.2% estrus response using Presynch protocol.

Table 1. Efficacy in term of induced estrus response with Presynch and control group

Sr. No.	Groups (n=6)	Mean AI days Postpartum	No. of cows treated (n=6)	No. of cows exhibited estrus	No. of cows responded (%)
1.	Group-I (Presynch)	91.4	6	5	83.33
2.	Group-II (Control)	110.25	6	4	66.66

In Presynch group, 5 cows was responded to last $\text{PGF}_2\alpha$ injection but inseminate all the 6 cows as per fixed timed artificial insemination. The first service conception rate after 60 day of TAI observed in Presynch group were 50% and control group were 25% (Table 2). The first service conception rate was observed higher in Presynch group than the control group. The higher first service conception rate in Presynch group might be due to presynchronising the estrus cycle in Presynch treatment with $\text{PGF}_2\alpha$ (cloprostenol; 500 μg)

14 days apart which initiate the first injection of Ovsynch at a 5 to 12 day of estrus cycle in lactating dairy cows which resulted greater pregnancy per AI, (Vasconcelos *et al.* 1999). Administration of the first GnRH injection of Ovsynch on day 5 and 12 of estrus cycle may increase the probability of ovulating the dominant follicle of first follicular wave of estrus cycle, and improving synchrony of emergence of a new wave and synchronized ovulation rate to second GnRH injection of Ovsynch (Navanukraw *et al.* 2004).

Table 2. The first service conception rate in Presynch and control group

Sr. No.	Groups (n=6)	No. of cows treated (n=6)	No. of cows responded	No. of cows conceived	Conception rate (%)
3	Group-I (Presynch)	6	5	3	50
4	Group-II (Control)	6	4	1	25

The first service conception rate with Presynch protocol observed in present study is in accordance with Moreira *et al.* (2001) reported 46.9 ± 6.9 % first service conception rate with Presynch protocol. Similarly Navanukraw *et al.* (2004) also reported 49.6 % first service conception rate with Presynch protocol.

The mean hemoglobin level on day of selection (day 0), initiation of synchronization treatment (day 10) and on day of estrus observed were 11.23 ± 0.30 , 11.69 ± 0.28 and 12.37 ± 0.29 gm/dl, respectively and observed in normal physiological limit at different time interval. The mean haemoglobin level on day of estrus observed in study was significantly higher ($P < 0.05$) as compared to day 0. The present findings for haemoglobin level on day of estrus are in accordance with Kumar and Sharma (1991) and Khamas *et al.* (2013) who reported 11.71 ± 0.21 and 10.68 gm/dl in cyclic cows.

Table 3. The Haematological Parameter in postpartum dairy cows at different intervals

Sr. No.	Parameters	0 Day (n=12)	10 th day (n=12)	Day of estrus (n=12)	CD Value	
1	Haemoglobin (gm/dl)	11.23±0.30 ^a	11.69±0.28 ^b	12.37±0.29 ^b	CD(0.05)=0.823	
2	PCV (%)	32.33±1.01	33.33±1.01	34.25±1.08	NS	
3	D L C	Neutrophils (%)	35.62±0.84	35.5±0.63	36.37±0.58	NS
		Lymphocytes(%)	55.21±0.89	56.79±0.65	56.88±0.63	NS
		Eosinophils (%)	6.29±0.60 ^a	4.83±0.38 ^b	3.88±0.34 ^b	CD(0.01) = 1.720 CD(0.05) = 1.295
		Monocytes(%)	2.21±0.20	2.25±0.19	2.29±0.12	NS
		Basophils(%)	0.58±0.13	0.62±0.14	0.58±0.13	NS

NS indicate non-significant difference

Mean bearing same superscript in a row do not differ significantly.

The mean packed cell volume percentage on day of selection (day 0), initiation of synchronization treatment (day 10) and on day of estrus observed were 32.33±1.01, 33.33±1.01 and 34.25±1.08 %, respectively and observed in normal physiological limit at different time interval. The present findings for mean packed cell volume percent on day of estrus is in accordance with Khamas *et al.* (2013) who reported 43.06±0.44 mean packed cell volume percent in cyclic Holstein cows.

The mean value of neutrophils, lymphocytes, eosinophils, monocytes and basophils count on day of selection (day 0) were 35.62±0.84, 55.21±0.89, 6.29±0.60, 2.21±0.20 and 0.58±0.13 percent, respectively, whereas on day of initiation of synchronization treatment (day 10) were 35.5±0.63, 56.79±0.65, 4.83±0.38, 2.25±0.19 and 0.62±0.14 percent, respectively, and on day of estrus it were 36.37±0.58, 56.88±0.63, 3.88±0.34, 2.29±0.12 and 0.58±0.13 percent, respectively. The neutrophils, lymphocytes, eosinophils, monocytes and basophils counts observed in present study were in normal physiological limit and non-significant. The result of present findings on day of estrus is in concurrence with Ahmed *et al.* (2004) who recorded the percent of neutrophils, lymphocytes, eosinophils, monocytes, and basophils reported were 26.28±1.54, 61.96±1.69, 7.12±0.89, 4.16±0.44 and 0.08±0.05, respectively in normal cyclic crossbreed cows.

The biochemical parameters like serum calcium, serum phosphorus, serum total proteins and BUN were studied on the day of selection, after initial treatment (10th day) and on the day of estrus and represented in table 4.

Table 4. The Biochemical Parameter in postpartum dairy cows at different intervals

Sr. No.	Biochemical profile	Time Interval			CD Value
		0 Day	10 th day	Day of estrus	
1	Calcium mg/dl	9.95±0.31	10.25±0.30	10.60±0.29	NS
2	Phosphorus mg/dl	5.29±0.10	5.53±0.10	5.64±0.10	NS
3	Total proteins gm/dl	7.41±0.18	7.57±0.19	7.73±0.16	NS
4	BUN mg/dl	25.92±0.53	25.05±0.55	21.18±0.57	NS

NS indicate non-significant difference

The mean serum calcium level on day of selection (day 0), initiation of synchronization treatment (day 10) and on day of estrus observed were 9.95±0.31, 10.25±0.30 and 10.60±0.29 mg/dl, respectively. The mean serum phosphorus level on day of selection (day 0), initiation of synchronization treatment (day 10) and on day of estrus observed were 5.29±0.10, 5.53±0.10 and 5.64±0.10 mg/dl, respectively. The mean serum total proteins level on day of selection (day 0), initiation of synchronization treatment (day 10) and on day of estrus observed were 7.41±0.18, 7.57±0.19 and 7.73±0.16 gm/dl, respectively. The mean serum BUN level on day of selection (day 0), initiation of synchronization treatment (day 10) and on day of estrus observed were 25.92±0.53, 25.05±0.55 and 21.18±0.57 mg/dl, respectively and observed in normal physiological limit at different time interval. The mean serum calcium, phosphorus, total protein and BUN level observed at a different time interval were in normal physiological limit.

The findings for mean serum calcium level on day of estrus are in accordance with Amle *et al.* (2014) and Agrawal *et al.* (2015) who reported 10.39±0.31 and 11.66±1.18 mg/dl, respectively. The findings for mean serum phosphorus level on day of estrus are in accordance with Amle *et al.* (2014) and Agrawal *et al.* (2015) in Sahiwal cows who reported 5.40±0.30 and 6.22±0.48 mg/dl, respectively. The findings for mean serum total proteins level on day of estrus are in accordance with Purohit and Bishoni (1993), Ramkrishnan *et al.* (1997) and Agrawal *et al.* (2015) who reported 7.52±1.29, 6.85±0.16 and 8.20±1.09 gm/dl, respectively. The findings for mean serum BUN level on day of estrus is in accordance with Ahmed *et al.* (2004) who reported 30.88±2.42 mg/dl mean serum BUN value in cyclic crossbreed cows.

From the present study it was conclude the percent induced estrus response was numerically higher in Presynch group than control group (spontaneous postpartum estrus). The first service conception rate was observed higher in Presynch group than the control group. The

higher first service conception rate in Presynch protocol due to the application of Ovsynch protocol between the 5th and 12th day of the cycle which increases fertility and the pregnancy rate. On day of estrus all haematological and biochemical value are in normal physiological limit.

Acknowledgement

We thank to Livestock Instructional Farm PDKV, Akola and Gorakshan Sanstha, Gorakshan road, Akola, Maharashtra for their kind permission, help and co-operation extended for taking up this work on their animals. We also express our deeply thanks to Dr. Sanjay Awghate, Regional Manager, Virbac Animal Health India, Private Limited, Mumbai for providing all help needed.

References

- [1] Agrawal J.K., A.Saxena and V. Singh (2015) Study on metabolic profile of repeat breeder, post partum anestrous and normal cyclic Sahiwal cows. *Indian Journal of Animal Reproduction* **36**(1).
- [2] Ahmad, I., L.A. Lodhi, Z.I. Qureshi and M. Younis (2004) Studies on blood glucose, total proteins, urea and cholesterol levels in cyclic, non-cyclic and endometritic crossbred cows. *Pakistan Vet. J.* **24**(2): 92-94.
- [3] Akoz,M., I.Aydin and D.A.Dinc (2008) Efficacy of the Presynch –Ovsynch programme on some reproductive parameters in postpartum dairy cows. *ActaVeterinaria*.**58**: (477-486).
- [4] Amle, M., V. Patodkar, R Shelar and H. Birsde (2014) Serum biochemical levels of repeat breeder crossbred cows under rural condition of Satara district of maharashtra. *International Journal of Advanced Vet.Sci. and Technology*.**3**(1):109-113.
- [5] El-Zarkouny, S.Z., J.A. Cartmill, B.A. Hensley and J.S. Stevenson (2004) Pregnancy in dairy cows after synchronised ovulation regimens with or without Presynchronization and progesterone. *J. dairy Sci.***87**(4):1024-1037.
- [6] Gumen, A., A. Keskin, G.Y.Mecitoglu, E. Karakaya, A. Alkan, H. Okut and M.C. Wiltbank (2012) Effect of presynchronization strategy before Ovsynch on fertility at first service in lactating dairy Cows.*Theriognology*.**78**(8):1830-1838.
- [7] Khamas, D.J., T.M. al-Hamedawi and K.O. Al-Jeburii (2013) The effect of using different periods of estrus synchronization on the reproductive performance and subsequent haematological value before and during pregnancy in Holstein heifers. *International J. Sci. and Nature*. **4**(1):63-67.

- [8] Kumar, S. and M.C. Sharma (1991) Level of hemoglobin and certain serum biochemical constituents in rural cows during fertile and non-fertile oestrus. *Indian Vet. J.* **68**: 361-364.
- [9] Moreira, F., R.L. De La Sota, T. Diaz and W.W. Thatcher (2000b) Effect of day of estrus cycle at the initiation of timed artificial insemination protocol on reproductive responses in dairy heifers. *J. Anim. Sci.* **78**:1568-1276.
- [10] Moreira, F., C. Orlandi, C. A. Risco, R. Mattos, F. Lopes and W. W. Thatcher (2001) Effect of Presynchronization and bovine somatotropin on pregnancy rates to a timed artificial insemination protocol in lactating dairy cows. *J. Dairy Sci.* **84**:1646-1659.
- [11] Navankraw, C., D.A. Redmer, L.P. Reynolds, J.D. Kirsch, A.T. Grazul-Bilska, and P.M. Fricke (2004) A Modified presynchronization protocol improves fertility to timed artificial insemination in lactating dairy cows. *J Dairy Sci.***87**:1551-1557.
- [12] Purohit, G.N. and B.L. Bishnoi (1993) Some blood biochemical studies in Rathi cows and Heifers before and after induction of oestrus with Fertivet. *Indian J. Anim. Reprod.* **14**(2) :74-76.
- [13] Ramakrishna, K.V. (1997) Comparative studies on certain biochemical constituents of anoestrus cross bred Jersey rural cows. *J. Ani. Rep.* **18**(1): 33-35.
- [14] Stevenson, J. (2017) Hoards dairyman: to presynch or not to presynch. [Hoards.com/print-article-2395-permanent-html](https://www.hoards.com/print-article-2395-permanent-html).
- [15] Vasconcelos, J.L.M., R.W. Silcox, G.J.M. Rosa, J.R. Pursley, and M.C. Wiltbank (1999) Synchronization rate, size of the ovulatory follicle, and pregnancy rate after synchronization of ovulation beginning on different days of the estrus cycle in lactating dairy cows. *Theriogenology.***52**:1067-1078