Original Research

Comparative Efficacy of Two Different Synchronization Protocol in Postpartum Dairy Cows

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Abstract

The study was undertaken to find out the efficacy of Ovsynch and Double PGF$_2\alpha$ protocol in terms of estrus induction, time required for onset of induced estrus, duration of induced estrus and conception rate in postpartum dairy cows. Total twelve cows with 40-60 postpartum days from 2nd to 4th lactation were selected and divided into two groups comprising six cows in each group. In Group-I cows received Ovsynch protocol with 18 to 20 hrs. fixed TAI. In Group-II cows were treated with Double PGF$_2\alpha$ protocol and inseminated after detected estrus. The first service conception rate was recorded on day 60 post insemination. The percent induced estrus response recorded in Ovsynch group was 83.33 and Double PGF$_2\alpha$ group 100 percent, respectively. The time required for onset of induced estrus and duration of induced estrus observed in Ovsynch and Double PGF$_2\alpha$ protocol was 53.20±1.8; 21.2±0.58 and 50.67±1.54; 21.33±0.49, respectively. The first service conception rate was 33.33 percent observed in Ovsynch and double PGF$_2\alpha$ group, respectively. The percent induced estrus response was numerically higher in PGF$_2\alpha$ group as compared to Ovsynch group whereas the first service conception rate in Ovsynch and double PGF$_2\alpha$ group was at par.

Key words: Conception Rate, Double PGF$_2\alpha$, Estrus Synchronization, Ovsynch, Postpartum

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Introduction

Most estrus synchronization programs in dairy cattle mainly involve the use of the luteolytic agent prostaglandin or analogues. A double prostaglandin protocol applied 11-14 days apart seems to be capable of bringing most cows to estrus. PGF$_2\alpha$ controls life span of the corpus luteum, but cannot alter the course of follicular waves. Estrus will form due to changes at the developmental stage of preovulatory follicles during the post-injection period of PGF$_2\alpha$ and the ensuing ovulation may take a week. Therefore, due to the

continuation of a need for estrus detection in $PGF_2\alpha$ applications, insemination time cannot be controlled (Twagiramungu *et al.*, 1995; Pursley *et al.*, 1997a; Pursley *et al.*, 1997b; Guilbault *et al.*, 1998). Ultimately, reproductive physiologists have developed methods that limit estrus observation where ovulation which named as "Ovsynch" (Pursley *et al.*, 1995; Pursley *et al.*, 1997b). This protocol is a successful method of synchronization that has been tried intensively in cows at lactation and positive results have been obtained. Cervical mucus is a visco-elastic secretion of constantly secreting mucus producing cells of endo-cervix (Glover, 1960) and acts as a mechanical barrier to prevent intruding organisms. Colour, appearance, pH and electrical conductivity along with other rheological properties like spin barkeit value, elasticity, viscosity and fern (arbonisation) pattern are the most important properties in relation to fertility (Pandey *et al.*, 1983). The occurrence of crystallization is common to all types of mucus. But degree of crystallization or arbonisation pattern in cervical mucus is under the control of two ovarian hormones viz. estrogen and progesterone. The phenomenon of crystallization in cervical mucus progresses under the influence of estrogen whereas progesterone dimishes the formation of arbonisation pattern (Tsiligianni *et al.*, 2001). Thus it can be quite useful in predicting the onset of estrus, different stages of estrus and ovulation time in cattle and buffaloes (Alena *et al.*, 2008). Hence the present investigation was carried out to study the induced estrus response, time required for onset of induced estrus, duration of induced estrus and conception rate in Ovsynch and Double $PGF_2\alpha$ group.

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 2^{nd} to 4^{th} 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 AD_3EH 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.

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Group I (Ovsynch)

Ovsynch protocol were carried out with administrating 10 ug of GnRH analogue (Buserlin acetate) at any stage of estrus cycle (day 0) followed by 500 ug Cloprostenol (day 7) and second GnRH inj. 48 hrs after $PGF_2\alpha$ administration and fixed time A.I. done at 18 to 20 hrs post second GnRH administration.

Group II (Double PGF2α)

Cows were received two injections of $PGF_2\alpha$ (500 µg Cloprostenol) 14 days apart and inseminated according to detected estrus.

The induced estrus response was calculated on the basis of number of cows responded (exhibited estrus symptoms) after $PGF_2\alpha$ injection. The time required for estrus induction was calculated from time of $PGF_2\alpha$ injection to first detection heat symptoms by visual observations and the duration of induced estrus was calculated from expression of first sign of behavioural symptoms of estrus to the cessation of behavioural symptoms of estrus. The estrual cervical mucus was collected from dairy cows who exhibited estrus and collected in petri dish before the insemination. The collected estrual cervical mucus was used to study the fern pattern, hydrogen ion concentration (pH) and spinbarkeit value. In fern pattern examination two to three drops of well mixed cervical mucus was spread uniformly over grease free glass slide and air dried. The air dried slide was examined under microscope using low power objective 10x for crystallization pattern of cervical mucus, known as arbonization pattern. The arbonization pattern of observed mucus was grouped as per Dodamani *et al.* (2010) into typical and atypical type of fern pattern. In Hydrogen ion examination the cervical mucus was determined by Himedia pH indicator papers with 0.5 range difference, immediately after collection. The change of colour of pH indicator paper was matched with standard colour, to determine hydrogen ion concentration (pH). In spinbarkeit value examination two to three drops of collected cervical mucus was taken on a grease free glass slide and another grease free glass slide was placed over it. The mucus was stretched between two slides by moving second slide away from first one, until mucus breaks. The distance between two slides just before the breakage of mucus, string was measured through a scale (cm scale).

Statistical Analysis

The data was analysed by unequal completely randomized design online software of Web Agri Star Package 2.0.

Results and Discussion

The number of cows responded to treatment in Ovsynch group was 5 out of 6 (83.33 %) within 65.5 postpartum days and 6 cows out of 6 exhibited estrus from double $PGF_2\alpha$ group (100%) within 70.1 postpartum days (Table 1).

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Table 1: Efficacy in term of induced estrus response with Ovsynch and double $PGF_2\alpha$ protocol

S. 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 (Ovsynch)	65.5	6	5	83.33
2	Group-II (Double PGF2α)	70.1	6	6	100

In the present study it was observed that the efficiency in terms of estrus response was higher in double $PGF_2\alpha$ group as compare to Ovsynch group. The present findings for the induced estrus response in double $PGF_2\alpha$ group are in accordance with Khamas *et al.* (2013) who observed 100% estrus response by using double $PGF_2\alpha$ (cloprostenol 500 µg) injection 10 and 12 days apart and also reported 90.90% estrus response by using double $PGF_2\alpha$ (Cloprostenol 500µg) injection 11 days apart in Holstein heifers. Similarly, Sahatpure and Patil (2008) in crossbreed cows and Dherange (2000) in Red Kandhari cows reported 100% and 90% estrus response, respectively. The present findings for the induced estrus response in Ovsynch group (GI) is in accordance with Twagiramungu *et al.* (1992) who reported 85.20 % estrus response in beef cows, similarly, Sathiamoorthy and Subramanian (2003) and Ramkrishnan *et al.* (2012) also reported 80 and 83.33 percent estrus response in Gir cows, respectively which is in accordance with the present findings. All the cows who exhibited estrus are observed for time required for onset of estrus. The average time required for onset of estrus after last $PGF_2\alpha$ injection observed in Ovsynch and double $PGF_2\alpha$ were 53.20±1.8 and 50.67±1.54 hrs, respectively (Table 2).

Table 2: Mean time required for onset of induced estrus in Ovsynch and double $PGF_2\alpha$ protocol

Sr. No.	Groups (n=6)	No. of cows treated	No. of cows exhibited estrus	Average time required for onset of estrus (hrs)
1	Group-I (Ovsynch)	6	5	53.20±1.8
2	Group-II (Double PGF2α)	6	6	50.67±1.54

(Differences between means were found statistically non-significant)

In the present findings it was observed that mean time interval for onset of induced estrus show non-significant difference in Ovsynch and double $PGF_2\alpha$ protocols. The present findings of mean time interval for onset of induced estrus in Ovsynch group is in accordance with Sathiamoorthy *et al.* (2007) and Ahmed *et al.* (2016) who reported 56.40±8.40 hrs and 48.75±0.71 hrs average time interval for onset of estrus, respectively. The present findings of mean time interval for onset of induced estrus in double $PGF_2\alpha$ group (GII) is in accordance with Sahatpure and Patil (2008) who recorded 54.40±2.60 and 55.58±3.28 hrs average time interval for onset of induced estrus in non-descript and crossbreed cows with double dose of $PGF_2\alpha$ (lutalyse 25 mg) injection at 11 days apart. Also the cows who exhibited estrus observed for duration

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of induced estrus. The mean duration of induced estrus recorded in Ovsynch and double PGF2α were 21.2±0.58 and 21.33±0.49 hrs, respectively (Table 3).

Table 3: Duration of induced estrus in Ovsynch and double $PGF_2\alpha$ protocol

Sr. No.	Groups (n=6)	No. of cows treated (n=6)	No. of cows exhibited estrus	Duration of estrus (hrs)
1	Group-I (Ovsynch)	6	5	21.2±0.58
2	Group-II (Double PGF2α)	6	6	21.33±0.49

(Differences between means were found statistically non-significant)

There was no significant difference between the mean duration of estrus between the synchronized groups. The present findings for mean duration of estrus in Ovsynch group (GI) are in accordance with Sathiamoorthy and Subramanian (2003), Sathiamoorthy *et al.* (2007) and Ahmed *et al.* (2016) who reported 20.50±2.50, 18.40±2.60 and 21.083±0.78 hrs duration of estrus in cows, respectively. The present findings of mean duration of estrus in double $PGF_2\alpha$ group (GII) are in accordance with Dherange (2000) in Red Kandhari cows, Patil and Pawshe (2011) who recorded 19.11±2.03 and 19.2±0.86 hrs duration of estrus in cows, respectively. In Ovsynch group, 5 cows was responded to last $PGF_2\alpha$ injection but inseminate all the 6 cows in group as per fixed timed artificial insemination. The first service conception rate after 60 day of TAI was 33.33 % in Ovsynch and double $PGF_2\alpha$ group (Table 4).

Table 4: The first service conception rate in Ovsynch and double PGF2α protocol

S. No.	Groups (n=6)	No. of cows treated	No. of cows responded	No. of cows conceived	Conception rate (%)
1	Group-I (Ovsynch)	6	5	2	33.33
2	Group-II(Double PGF2α)	6	6	2	33.33

In the present study the first service conception rate in Ovsynch and double $PGF_2\alpha$ protocols was observed at par. The present findings for first service conception rate in Ovsynch group (GI) are in accordance with Moriera *et al.* (2001), Prajapati *et al.* (2015) and Peters and Pursley (2002) who recorded 34.4%, , 30% and 38.3% first service conception rate, respectively. In contrast, higher first service conception rate was reported by Ramkrishnan *et al.* (2012) and Dhami *et al.* (2015) who reported 50 percent in Gir and crossbreed anestrus cows, respectively. Whereas, lower first service conception rate (16.66%) reported by Naikoo *et al.* (2016) in Kankrej cows. The present findings for first service conception rate in double $PGF_2\alpha$ are in accordance with Hassan *et al.* (2017) who reported 31% first service conception rate, respectively. The higher first service conception rate than present findings of double $PGF_2\alpha$ group recorded by Venkataramana *et al.* (2013) who reported 67 percent first service conception rate in Ongole cows. The discrepancy in first service conception rate in present study with the earlier findings of various research

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workers might be due to variation in reproductive status of animal, breed, different feeding patterns, method of estrus detection and molecule of prostaglandin used. The cervical mucus attributes like the hydrogen ion concentration (pH), spinbarkeit value and fern pattern was carried out during the present study at the time of estrus to evaluate the cervical mucus attributes parameters (Table 5).

Table 5: The cervical attributes in postpartum dairy cows

Sr. No.	No. of Cows	Cervical Attributes			
		pH	Spinbarkeit Value (cm)	Fern Pattern (%)	
				Typical	Atypical
1	20	7.5±0.19	12.45±0.35	80	20

In the present study, the mean pH, Spinbarkeit value during estrus observed were 7.5±0.19 and 12.45±0.35 cm, respectively. Similarly the type of fern pattern were observed 80% (16/20) typical and 20% (4/20) atypical fern pattern. The present findings of mean pH value on day of estrus are in accordance with Gupta *et al.* (1981), Rao and Rao (1982), Malik *et al.* (2013) and Bhat *et al.* (2015) who reported 7.8±3.60, 7.93, 7.35±0.16 and 7.48±0.09, respectively in normal cyclic cows. The present findings of mean spinbarkeit value of cervical mucus are in accordance with Pattabiraman *et al.* (1967) and Modi *et al.* (2011) who reported 14 and 15.03±0.51 cm mean spinbarkeit value, respectively in healthy cyclic cows. The present findings for type of fern pattern of cervical mucus are in accordance with Rao and Rao (1982) reported 85.37% (typical) fern pattern in crossbreed heifers. Similarly Adhalikar *et al.* (1986) reported 75.5% (typical) fern pattern in ovulated crossbreed cows.

Conclusion

It was conclude that the percent induced estrus response was numerically higher in double $PGF_2\alpha$ group as compared to Ovsynch. There was no significant difference in mean time interval for onset of induced estrus and mean duration of induced estrus between the synchronized groups.The first service conception rate in Ovsynch and double $PGF_2\alpha$ protocols was observed at par. The mean values of pH and spinbarkeit were observed in normal range for optimum fertility.

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