



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(5): 961-964

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Received: 07-07-2019

Accepted: 09-08-2019

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Comparative efficacy of synchronization protocols for improving fertility in postpartum crossbred dairy cows

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Abstract

The objective of present research work is to study the efficacy of two different synchronization protocols for improving the fertility in postpartum crossbred cows. A total of 20 healthy crossbred cows at 60-90 days postpartum were selected from Dr. PDKV, Akola dairy farm and used in this study. Cows were examined for health disorders and palpated per rectum for ovarian activity before synchronization. Pre synchronization medicinal treatment was given to the cows before synchronization. Cows in group-I (n=10) received Ovsynch protocol and cows from group II (n=10) were received two injections of PGF₂α (500 µg Cloprostenol) 11 days apart and fixed time A.I. was done at 24 to 48 hrs post second PGF₂α administration in both the groups. Estrus detection and intensity of oestrus was done by visual observation and per rectal examination. The percent estrus response observed in present study showed no significant difference between both the groups. The mean time interval for onset of induced estrus show non-significant difference in Ovsynch and double PGF₂α protocols. The mean duration of estrus showed no significant difference between the synchronized groups. The percent intense type of intensity was numerically higher in Double PG protocol as compared to Ovsynch protocol. From the present findings it was observed that the number of animal pregnant at first service was numerically higher in Ovsynch as compared to double PGF₂α. The Ovsynch protocol induces better estrus response and first service conception rate in post partum cows.

Keywords: Cattle, synchronization, ovsynch, double pgf₂α, oestrus response

1. Introduction

The estrus synchronization is a hormonal regulation of estrus cycle at a time in a group of animals with timed A.I. It allows a decrease in unproductive periods by controlling the postpartum subestrus or anestrus. Synchronization also allows one to choose the milk production peak during a period when the milk market price is higher. Synchronization reduces the number of days spent visually appearing estrus, it also increases the accuracy of heat detection. Hormonal programs which eliminate the need for estrus detection and allow timed artificial insemination (TAI) are more attractive. For the proper time of A.I. at standing estrus at farmer's door in field condition, the synchronization of ovulation with Ovsynch protocol can be very effective. Prostaglandin F₂α is the most frequently used hormone for estrus synchronization in cows (Patterson *et al.*, 2003) [1]. PGF₂α controls life span of the corpus luteum, but cannot change the course of follicular waves. Due to changes at the developmental stage of preovulatory follicles during the post injection period of PGF₂α, estrus and the ensuing ovulation may take a week. Therefore, there is need of estrus detection in PGF₂α applications, insemination time cannot be controlled (Twagiramungu *et al.*, 1995 [2]; Pursley *et al.*, 1997a [3]; Pursley *et al.*, 1997b [4]; Guilbault *et al.*, 1998 [5]). Ultimately, reproductive physiologists have developed methods that limit estrus observation where ovulation rather than estrus is synchronized (Pursley *et al.*, 1995 [6]). The method that synchronizes ovulations is named briefly as "Ovsynch" (Pursley *et al.*, 1995 [6]; Pursley *et al.*, 1997b [4]). The aim of this method is to ensure ovulation at a specified time with consecutive applications of hormones like (GnRH, PGF₂α, GnRH). Ovulation synchronization can be achieved at a rate of 80-90% with Ovsynch protocol (Vasconcelos *et al.*, 1999 [7]). This protocol is a successful method of synchronization that has been tried intensively in cows at lactation and positive results have been obtained.

2. Materials and Methods

A total twenty healthy 60-90 days postpartum crossbred cows selected from Livestock Instructional Farm, Dr. PDKV, Akola. Cows were examined for health disorders and palpated per rectum for ovarian activity before synchronization. In addition, animals were scored for their body condition score on the basis of five point scale (Scale 0-5 units; 1 = emaciated, 5 = obese). Cows having body condition scores greater than 2.5 have been selected and included in the study. Pre synchronization medicinal treatment was given to the cows before synchronization. PSMT includes Injection Ivermectin (Hitek), Injection Phosphorus (Urimine), and Chelated mineral mixture (Chelated Agrimin forte) orally @ 50gm daily for next 15 days. All the injections were administered intramuscularly except injection Ivermectin for deworming. Cows of this treatment group-I received Ovsynch protocol with administering 10 ug of GnRH analogue (Buserelin acetate) at any stage of estrus cycle (day 0)

followed by 500 ug Cloprostenol (PregOva, Virbac Animal Health India Pvt. Ltd.) (day 7) and second GnRH inj. 48 hrs after PGF₂α administration and fixed time A.I. done at 18 to 20 hrs post second GnRH administration. And group-II cows (n=10) received two injections of PGF₂α (500 µg Cloprostenol) 11 days apart and fixed time A.I. was done at 24 to 48 hrs post second PGF₂α administration. Estrus detection and intensity of oestrus was done by visual observation and per rectal examination. Statistical analysis was carried out by using Complete Randomized Design (CRD) using statistically Web Based Agricultural Statistics Software Package (WASP 2.0).

3. Results and Discussion

3.1 Estrus response to treatment

The percent estrus response observed in First PGF₂α, Second PGF₂α and ovsynch protocol were 80.00, 100 and 100 percent, respectively. (Table 1).

Table 1: Induced Estrus Response in different groups

Sr. No	Groups	No. of cows treated	No. of cows responded	Percent responded
1	Group-I First PGF ₂ α	10	08	80.00
2	Group-I Second PGF ₂ α	10	10	100.00
3.	Group-II GPG protocol	10	10	100.00

From the present findings it was observed that the efficiency in terms of estrus response was numerically lower with first PGF₂α injection as compared to second PGF₂α injection in Group – I, whereas, it was recorded similar induced oestrus response with second PG injection of Group-I and Group –II cows. There was no significant difference between both the groups (Student T test). The present findings for the induced estrus response in double PGF₂α group (GI) after second PGF₂α injection is in accordance with Hirole *et al.*, (2018) [8] and Khamas *et al.* (2013) [9] who observed 100% estrus response by using double PGF₂α (cloprostenol 500 µg) injection. Similarly Sahatpure and Patil (2008) [10] in crossbred cows and Dherange (2000) [11] in Red Kandhari cows reported 100% and 90% estrus response, respectively. The present findings observed in Ovsynch group are in accordance with Deshmukh *et al.* (2017) [12], Borhaniya *et al.* (2012) [13], Ramkrishnan *et al.* (2012) [14], Krishnakumar and Chandrahasan (2012) [15] who reported 100% oestrus response after Ovsynch treatment. The similar type of results

were also obtained by researchers such as Velladurai *et al.* (2014) [16], Dhami *et al.* (2015) [17] and Ahmed *et al.* (2016) [18] have found the 100 percent estrus response with Ovsynch protocol for synchronization. The lower induced estrus response reported by Twagiramungu *et al.* (1992) [19] who reported 85.20% estrus response in beef cows, similarly Richardson *et al.* (2002) [20], Sathiamoorthy and Subramanian (2003) [21], Ramkrishnan *et al.* (2012) [14], Hassan *et al.* (2017) [22] and Hirole *et al.* (2018) [8] also reported 77.70 in heifers, 80, 83.33 in Gir cows, 87%, estrus response in Sahiwal cows and 83.33% in crossbred cows, respectively which is not in accordance with the present findings of Ovsynch protocol.

3.2 Time required for onset of estrus

The average time required for onset of estrus after last PGF₂α injection observed in Ovsynch and double PGF₂α protocol were 54.60 ± 2.44 and 56.40 ± 2.22 hrs, respectively. (Table 2).

Table 2: Mean time required for onset of induced estrus in Ovsynch and double PGF₂α protocol.

Sr. No.	Groups (n=10)	No. of cows treated	No. of cows exhibited estrus	Average time required for onset of estrus (hrs)	Student 'T' test
1.	Group-I (Ovsynch)	10	10	54.60 ± 2.44	NS
2.	Group-II (Double PGF ₂ α)	10	10	56.40 ± 2.22	NS

NS indicate non-significant difference

From the present findings it was observed that mean time interval for onset of induced estrus show non-significant difference in Ovsynch and double PGF₂α protocols. The result observed in present study for mean time required for onset of induced estrus are similar and in agreement with findings of Hirole *et al.* (2018) [8] who recorded the time required for onset of induced estrus with Ovsynch protocol was 53.20±1.8.hrs similarly, Sathiamoorthy *et al.* (2007) [23] reported mean interval from PGF₂α injection to the onset of estrus followed by Ovsynch protocol for non-descript cows was 56.40± 8.40 hrs. The present findings of mean time interval for onset of induced estrus in double PGF₂α group

(GII) is in accordance with Sahatpure and Patil (2008) [10] who recorded 54.40±2.60 and 55.58±3.28 hrs average time interval for onset of induced estrus in non-descript and crossbred cows with double dose of PGF₂α (Lutalyse 25 mg) injection at 11 days apart. Similarly, Ahlawat *et al.* (2015) [24] reported 56.86±1.96 hrs mean time interval for onset of estrus with double dose of PGF₂α 11 days apart.

3.3 Duration of induced estrus with Ovsynch and double PGF₂α protocol in postpartum dairy cows.

The mean duration of estrus recorded in Ovsynch and double PGF₂α protocol were 22.80±0.44 and 23.80±0.55 hrs,

respectively. (Table 3). There was no significant difference between the mean duration of estrus between the

synchronized groups

Table 3: Duration of induced estrus in Ovsynch and Double PGF₂α protocol.

Sr. No.	Groups	No. of cows treated	No. of cows exhibited estrus	Duration of estrus (hrs)	Student 'T' test
1	Group-I (Ovsynch)	10	10	22.80±0.44	NS
2	Group-II (Double PGF ₂ α)	10	10	23.80±0.55	NS

NS indicate non-significant difference

The present findings for mean duration of estrus in Ovsynch group (GI) are in accordance with Sathiamoorthy and Subramanian (2003)^[21], Ahmed *et al.* (2016)^[18], Hirole *et al.* (2018)^[8] and Krishnakumar and Chandrahasan (2012)^[15] who reported 20.50±2.50, 21.083±0.78, 21.2±0.58 and 21.80 ±0.80 hrs duration of estrus in cows, respectively. Similarly, Deshmukh *et al.* (2017)^[12] reported the duration of oestrus observed was 21.42± 0.57, 22.25± 0.54 and 21.84± 0.65 hrs in Crushed Flaxseed, soybean supplementation and no fat supplementation crossbred cows, respectively which is in

accordance with the present findings. The present findings of mean duration of estrus in double PGF₂α group (GII) is in accordance with Hirole *et al.* (2018)^[8] who reported 21.33± 0.49 hrs in crossbred cows.

3.4 Intensity of estrus

The incidence of intense (40%), intermediate (40%) and weak (20%) intensity of estrus in ovsynch protocol and 50% intense, 30% intermediate and 20% weak in double PG protocol was recorded in the present study (Table:4).

Table 4: Percent intensity of estrus in different groups.

Groups	Intensity of Estrus (%)		
	Intense (%)	Intermediate (%)	Weak (%)
Group-I Ovsynch protocol	40	40	20
Group II Double PG protocol	50	30	20

The percent intense type of intensity was numerically higher in Double PG protocol as compared to Ovsynch protocol which might be due to the variation in large preovulatory follicle size. The present findings of percent intensity of oestrus in Ovsynch protocol are similar and in accordance with the observations recorded by Deshmukh *et al.* (2015)^[25] who recorded the incidence of intense, intermediate and weak estrus to be 40, 40 and 20 per cent, respectively. Similarly, Bhoraniya *et al.* (2012)^[13] reported 50, 33.33, and 16.66% intense, medium and weak type of intensity, respectively. The

present findings of intensity of oestrus in double PG protocol are similar and are partially in accordance with Makode (1990)^[26] recorded intense, intermediate and weak oestrus to be 37.5, 37.5 and 25.0% respectively.

3.5 Conception rate

In present study, 10 animals were included in each treatment groups (n=10). The first service conception rate was observed as 50.00 and 40.00 percent, respectively in both GPG and DPG group (Table.No.5).

Table 5: Conception rate in different groups.

Groups	No. of cows treated	No. of cows responded	No. of animal inseminated	No. of animal pregnant at first service
Group-I Ovsynch protocol	10	10 (100%)	10	05 (50.00%)
Group II Double PG protocol	10	10 (100%)	10	04 (40.00%)

From the present findings it was observed that the number of animal pregnant at first service was numerically higher in Ovsynch as compared to double PGF₂α The higher first service conception rate in Ovsynch group as compared with double PGF₂α group might be due to the administration of the first GnRH injection on day 5 and 10 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 follicular wave and synchronized ovulation rate due to second GnRH injection of Ovsynch (Navanukraw *et al.* 2004)^[27]. The present findings for first service conception rate in Ovsynch group (GI) are in accordance with Pursley *et al.* (1995)^[6], DeJarnette *et al.* (2004)^[28] in multiparous Angus cows, Ramkrishnan *et al.* (2012)^[14] in Gir cows, Dhami *et al.* (2015)^[17] in crossbred anestrus cows and Ahmed *et al.*, (2016)^[18] who reported 50, 51, 50, 50 and 50% first service conception rate, respectively. The present findings for first service conception rate in double PGF₂α (GII) is in accordance with Anderson (1998)^[29] who reported 38.9% first service conception rate.

4. Conclusion

The Ovsynch protocol induces better estrus response and first service conception rate in post partum cows.

5. Acknowledgement

I humbly grab this opportunity to acknowledge reverentially, Dr. Sanjay Awaghate, Regional Business Manager, Mr. Azher Ali, Area Business Manager and Mr Syed Shoaib Ali, Business Officer of Ms. Virbac Animal Health India Pvt. Ltd who deserves special mentions for their varied contributions in assorted ways that helped me during my Ph.D. special research problem and the making of this research report. I could never have embarked and finished the same without the kind support and encouragement. I am extremely thankful to the M/s. Virbac Animal Health India Pvt. Ltd, Mumbai for their kind cooperation in sending me the requested Drugs/Hormones of utilized in the present study.

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