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Comparison of ovsynch protocol with the additional GnRH administration during early and mid-luteal phase of ovsynch protocol in crossbred cows

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Abstract

Background: The study was designed to compare ovsynch protocol with the additional GnRH administration during the early and mid-Luteal phase of Ovsynch protocol with fixed-time AI in crossbred cows.

Methods: Thirty crossbred cows were allocated into three groups, Group I with an ovsynch protocol: Group II with an additional GnRH on day 6 after 2nd GnRH of Ovsynch and Group III with an additional GnRH on day 12 after 2nd GnRH of Ovsynch. The average number of services required per conception for Group I, Group II and Group III was found 2.40, 2.00 and 2.20 respectively and the conception rate was 50.0, 60.0 and 50.00 respectively.

Result: The present study concluded that a significantly ($p < 0.05$) higher conception rate was recorded in Group II (60.00 %) than that observed (50.00) with Group I and Group III.

In conclusion, the conception rate was better with an additional GnRH subsequent to ovsynch protocol with fixed time AI which can improve fertility response in crossbred cows.

Keywords: Crossbred cows, conception rate, ovsynch, GnRH, fixed-time AI

Introduction

India is having largest livestock resource which plays a significant role on the socio economic status and development of the country's rural population. In India, over 50 % of the rural households own livestock Ali, (2007) [3-4]. India ranks first in milk production; noting 18.5 % of world production, the Indian dairy industry has shown an unprecedented growth in milk production from about 55.6 million tonnes in 1991-92 and about 155.5 million tons in 2015-16 NDDB, (2017) with the growth rate of 6.28 %.

Whereas, the Food and Agriculture Organization (FAO) reported a 1.6 % increase in world milk production from 789.1 million tons in 2014 and 816 million tons in 2016. To maintain the growth rate in milk production for which reproduction is an important consideration, in the economics of cattle production. In absence of regular breeding and calving at the appropriate time, cattle rearing is not profitable. In dairy cattle farming, it is necessary to have a calf a year and to ensure that the postpartum cows should be pregnant at the first service. For this purpose, there should not be any problem in the herd regarding reproduction. The findings of researchers revealed that in cattle estrous synchronization of ovulation with FTAI is an effective management tool in lactating crossbred cows to increase reproductive efficiency De La Sota *et al.*, (1998) [8]. The Ovsynch protocol, which combines GnRH-PGF2 α -GnRH treatments, has made the planned breeding programme more effective manner Pursley *et al.*, (1997a). The effect of synthetic GnRH on conception rate in dairy cows when injected at the day between 11-13 after insemination is widely used, Rettmer *et al.*, (1992 a) [24]; Sheldon and Dobson, (1993) [32]; Singh,(2004) [33]; Jaswal and Singh, (2013) [13]; Dirandeh *et al.*, (2014) [10]; Birhanu Hailu *et al.*, (2015) [6]. However, relatively few studies have been undertaken to investigate the strategy of GnRH in FTAI protocol to improve ovulation and conception rates

and to induce the formation of accessory CL, and subsequent plasma progesterone concentrations. Therefore, the objective of the present study was to increase the efficacy of Ovsynch protocol in the induction of estrus in postpartum anestrous crossbred cows, to compare Ovsynch protocol with the efficacy of GnRH administration during the early and mid-luteal phase of estrous cycle of ovsynch protocols, and to enhance the conception rates in crossbred cows during postpartum period. The efficacy of therapeutic protocol was evaluated in terms of estrus responses such as duration of estrus, onset of estrus, intensity of estrus, and conception rates in postpartum crossbred cows.

Materials and Methods

Thirty postpartum anestrum crossbred cows after completion of 60 days postpartum period were subjected to the detailed gynecological examination of genital tract by rectal palpation, which are free from palpable genital abnormalities and free from uterine infections were selected for the study. The crossbred cows were randomly divided into three equal therapeutic groups so that each group consist 10 crossbred cows.

Group I: In this first group cows was injected with 10 μ g of GnRH IM on day 0, 500 μ g of cloprostenol (PGF2 α) IM on day 7 and 2nd dose of GnRH 10 μ g IM on day 9. Fixed time AI was done after 16 hours of the 2nd GnRH injection.

Group II: In this second group cows were injected with 10 μ g of GnRH IM on day 0, 500 μ g of cloprostenol (PGF2 α) IM on day 7 and 2nd dose of GnRH 10 μ g IM on day 9. Fixed time AI was done after 16 hours of the 2nd GnRH injection. And the third injection of GnRH analogue 10 μ g was administered IM at early luteal phase i.e on day 6 of estrous cycle (post AI).

Group III: In this third group cows were injected with 10 μ g of GnRH IM on day 0, 500 μ g of cloprostenol (PGF2 α) IM on day 7 and 2nd dose of GnRH 10 μ g IM on day 9. Fixed time AI was done after 16 hours of the 2nd GnRH injection. And the third injection of GnRH analogue 10 μ g was administered IM at mid luteal phase i.e on day 12 of estrous cycle (post AI).

The inseminations were conducted by using 0.25 ml of thawed "French mini straw" containing good quality of crossbred bull semen was deposited at the base of the body of the uterus just in front of the internal os of the cervix as fixed time AI 16 hours after 2nd GnRH injection and the therapeutic efficacy was expressed in terms of estrus response, intensity of estrus, duration of estrus and conception rates in the present investigation.

Results and Discussion

The present investigation entitled "Comparision of ovsynch protocol with the additional GnRH administration during early and mid-luteal phase of ovsynch protocol in crossbred cows" and here under discussed. The post insemination treatment with Gonadotropin releasing hormone (GnRH) had widely used for the improvement of conception rate in postpartum crossbred cows, to stimulate luteal tissues and to control follicular waves in cows. Moreover, most of the studies were focused on obtaining higher pregnancy rates with fixed time insemination.

Thirty postpartum anestrum crossbred cows after completion of 60 days postpartum period were subjected to detailed

gynaecological examination of genital tract by rectal palpation, which are free from palpable genital abnormalities and free from uterine infections were selected for the study. The crossbred cows were randomly divided into three equal therapeutic groups so that each group consist 10 crossbred cows.

Cattle are polyestrous animals and display estrous behavior approximately every 21 days. The estrous cycle is regulated by the hormones of the hypothalamus (Gonadotropin releasing hormone; GnRH) and the anterior pituitary (follicle-stimulating hormone; FSH and luteinizing hormone; LH).

Estrus Response: The estrus response was calculated as the percentage of treated cows which exhibited estrus. Estrus was detected on the basis of Behavioural, physical, and Gynaecological examination. The physical examination was carried out 24 hr after the PGF2 α injection. At every 12 hr to confirm the estrus, indication sings such as mucus discharges, edema & congestion of vulva, mounting behaviour and stand to be mounted in Group I, Group II and Group III groups of crossbred cows were observed. Estrus response was expressed in terms of percent. In the present study, the estrus response was 100.00 percent in all treated groups (Group I, Group II and Group III). Similar findings of estrus response were reported with Ovsynch protocol by Naidu (2004) ^[20], Selvaraju *et al.* (2008) ^[28], Ramakrishnan *et al.* (2012) ^[22], Navrange *et al.* (2012) ^[21], Mohd Alyas *et al.* (2013) ^[18], Buhecha *et al.* (2015) ^[7], Dhami *et al.* (2015) ^[9] and Ahmed *et al.* (2016) ^[2]. John *et al.* (2009) illustrated how GnRH hormone synchronizes follicular growth and ovulation, so that all the cows ovulate within a few hours of one another.

Onset of Estrus: The onset of estrus was calculated in hours (h) from the time of PGF2 α administration to the time of the first appearance of estrus signs in therapeutic crossbred cows. The mean onset of estrus was recorded as 49.7 \pm 14.5, 50.7 \pm 1.15 and 52.4 \pm 1.27 hrs in Group I, Group II and Group III respectively in crossbred cows in the present study. These findings are similar to the finding by Ahmed *et al.* (2016, 2017) ^[2-1] and Velladurai *et al.* (2014) ^[35].

Intensity of Estrus: The intensity of estrus was assessed in crossbred cows based on the visual and rectal examination of the external and internal genitalia for exhibited estrus symptoms and certain physiological changes in the reproductive organs as per the score card adopted by Rao and Rao (1984) ^[23]. The intensity of estrus was graded as weak, normal and intense by scoring less than 10, 10-15, and more than 15 points, respectively as per the modified score card. The mean score for estrus intensity were recorded as 12.90 \pm 0.77, 12.50 \pm 0.76 and 13.70 \pm 1.45 in Group I, Group II and Group III respectively.

Duration of Estrus: The duration of estrus was recorded as the interval in hours between the onset and cessation of estrus. The mean duration of estrus was recorded as 23.0 \pm 0.70, 22.7 \pm 0.60 and 23.1 \pm 0.64 hrs in Group I, Group II and Group III respectively in the present study. This might be due to the effect of GnRH on dominant follicle. The present results of duration of estrus were in accordance with the observation of Senthilkumar and Chandrahasan (2015) ^[31] and Ahmed *et al.* (2016) ^[2].

Services taken per conception: The number of services required per conception was found 2.40, 2.00 and 2.20 in

Group I, Group II and Group III respectively in the present study (Table 2), similar findings were recorded by Mandal *et al.*, (2004) [17].

Conception Rate: The postpartum anestrus crossbred cows in all the groups of the present study were subjected to pregnancy diagnosis by per rectal examination after sixty days

of insemination. Overall conception rate in therapeutic crossbred cows was recorded as 50.00, 60.00 and 50.00 per cent in Group I, Group II and Group III respectively in the present study (Table 1). Statistical analysis revealed that the conception rates were significantly ($p < 0.05$) higher in Group II than Group I and III.

Table 1: Conception rate in therapeutic groups of crossbred cows

| S. No. | Name of the group | Number of cows inseminate | Number of cows conceived | | | | | | Overall conception | Percent of pregnancy y |
|--------|-------------------|---------------------------|-------------------------------|---------|-----|---------|-----|---------|--------------------|------------------------|
| | | | No of services per conception | | | | | | | |
| | | | 1st | Percent | 2nd | Percent | 3rd | Percent | | |
| 1 | Group I | 10 | 3 | 30.00 | 2 | 40.00 | 0 | 0.00 | 5 | 50.00 |
| 2 | Group II | 10 | 4 | 40.00 | 2 | 28.60 | 0 | 0.00 | 6 | 60.00 |
| 3 | Group III | 10 | 4 | 40.00 | 1 | 14.30 | 0 | 0.00 | 5 | 50.00 |

Table 2: No of services taken per Conception in therapeutic groups of crossbred cows

| S. No. | Name of the group | Cows inseminated | | | | Cows pregnant (n) | No of services per conception |
|--------|-------------------|-----------------------------|-----------------------------|-----------------------------|-------|-------------------|-------------------------------|
| | | 1 st service (n) | 2 nd service (n) | 3 rd service (n) | Total | | |
| 1 | Group I | 10 | 2 | 0 | 12 | 5 | 2.40 |
| 2 | Group II | 10 | 2 | 0 | 12 | 6 | 2.00 |
| 2 | Group III | 10 | 1 | 0 | 11 | 5 | 2.20 |

Conclusion

The present study concluded that a significantly ($p < 0.05$) higher conception rate was recorded in Group II group (60.00 %) than that observed in Group I (50.00 %) and Group III (50.00 %). The present study concluded that in Group II group with the use of GnRH on day 6 post insemination had a significant ($p < 0.05$) effect on the conception rate in crossbred cows over Group I group with the Ovsynch protocol with post insemination and Group III with the use of GnRH on day 12 post insemination. In conclusion, the conception rate was better with an additional GnRH subsequent to ovsynch protocol with fixed time AI which can improve fertility response in crossbred cows.

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