SYNCHRONIZATION OF ESTRUS WITH GnRH AND $PGF_{2\alpha}$ DURING EARLY POSTPARTUM IN MEHSANA BUFFALOES

M.K. AWASTHI[1], F.S. KAVANI, A.J. DHAMI[2] and M.T. PANCHAL

Department of Animal Reproduction, Gynaecology and Obstetrics
College of Veterinary Science and Animal Husbandry,
Anand Agricultural University, Anand, 388 001 (Gujarat)

ABSTRACT

Present experiment was conducted to assess efficacy of estrus synchronization protocol using combination of GnRH and $PGF_{2\alpha}$ administration in postpartum Mehsana buffaloes (n=12) beginning on day 35 postpartum (day 0 for proposed protocol) with 20 µg Buserelin acetate i/m, followed by i/m injection of 25 mg Dinoprost tromethamin 10 days later. Another 6 animals of similar reproductive status were kept as control. Estrus was detected in animals twice daily and estrus animals were served with known fertile buffalo bull. Three animals showed premature estrus between days 0 and 10, i.e. prior to injection of prostaglandin, while 4 animals (33.33%) exhibited synchronized estrus after $PGF_{2\alpha}$ treatment. One animal with premature estrus and three animals with synchronized estrus conceived after service at induced estrus giving overall conception rate of 57.14% (4/7), whereas overall pregnancy rate was 33.33% (4/12). When the subsequent reproductive performance was compared between animals of treatment and control groups non-significant difference was recorded in occurrence of first postpartum estrus (74.5 ± 10.24 vs. 59.33 ± 7.92 days), calving to conception interval (95.0 ± 12.10 vs. 77.0 ± 20.36 days) and number of services per conception (1.50 ± 0.24 vs. 1.50 ± 0.37). From the present study, it is concluded that estrus synchronization protocol using combination of GnRH and $PGF_{2\alpha}$ administration may induce fertile estrus, however, there was no beneficial effect on subsequent reproductive performance of treated animals.

Keywords: Water buffaloes, postpartum, Estrus synchronization, Reproductive performance

Estrus synchronization programme have been used to manage reproduction in cattle and buffaloes for many years. These programmes involve various protocols for administration of a single hormone or combination of hormones, but results have varied among programmes and herd (Britt and Gaska, 1998). Studies have shown that administration of GnRH followed by $PGF_{2\alpha}$ increases the degree of synchrony and decrease the variability in the time to onset of estrus in lactating cows (Pursley *et al.*, 1997; Wolfenson *et al.*, 1994) with the interval to estrus after $PGF_{2\alpha}$ injection averaging 3 days.

Synchronization protocols that regulate follicular development with GnRH injection 7 days prior to luteolytic dose of $PGF_{2\alpha}$ not only improve estrus detection rates and synchrony of estrus (Thatcher *et al.*, 1993; Wolfenson *et al.*, 1994; Twagiramungu *et al.*, 1995) but also induce fertile estrus cycle in both cyclic and anestrus bovine females (Twagiramungu *et al.*, 1995; Thompson *et al.*, 1999; Stevenson *et al.*, 2000). Ovsynch (synchronization of ovulation) programme with a strategic combination of GnRH (two injections) and $PGF_{2\alpha}$ (one injection), results in an acceptable pregnancy rate with timed AI (TAI) without

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1 Corresponding Author : Associate Professor, Deptt. of AR, Gynaecology & Obstetrics, College of Veterinary Science & Animal Husbandry, PB No 6, Anjora, Durg, 491 001, Chhattisgarh

2 Research Scientist, Livestock Research Station, AAU, Anand, 388 001, (Gujarat)

estrus detection in cycling dairy cows (Thatcher *et al.*, 1989; Macmillan and Thatcher, 1991) and cycling buffaloes (Baruselli *et al.*, 1999). However, conception rates at TAI after Ovsynch treatment are reduced compared to cows inseminated following standing estrus (Stevenson *et al.*, 1999; Pursley *et al.*, 1997).

We hypothesized that reproductive efficiency of postpartum buffaloes may be improved by inducing early cyclicity through estrus synchronization programme using combination of GnRH (one injection) and $PGF_{2\alpha}$ (one injection). In perspective, present experiment was conducted with the objective of assessing the efficacy of estrus synchronization protocol during early postpartum period for induction of estrus and its effect on subsequent reproductive performance in postpartum Mehsana buffaloes.

Postpartum anestrus Mehsana buffaloes (n=18), 4-7 years of age, between second to fourth lactation and having normal parturition were selected at Livestock Research Station, Sardar Krushinagar-Dantiwada Agricultural University, Sardar Krushinagar, Gujarat for present study. The experiment was conducted from September to February being favourable period for breeding in buffaloes. Animals were randomly divided into treatment (n=12) and control (n=6) groups. Blood samples were collected on days -10 and 0 for estimation of plasma progesterone (P_4). Progesterone concentration was estimated in plasma samples using a radioimmunoassay (RIA) kit employing standard technique. Presence of progesterone >1 ng/ml in plasma in any of the two samples collected on day -10 or 0 was suggestive of cyclicity in the animal. On day 35 postpartum (day 0 for estrus synchronization protocol), the animals of treatment group were treated with 20 µg Buserelin acetate (Receptal, a GnRH analogue) i/m, followed by i/m injection of 25 mg Dinoprost tromethamin (Lutalyse, a naturally occurring $PGF_{2\alpha}$) 10 days later. No treatment was given to animals of control group. All animals were closely monitored for signs of estrus and were served with known fertile buffalo bull at detected estrus. The animals were considered responders to estrus synchronization protocol if signs of estrus were displayed within 6 days after $PGF_{2\alpha}$ injection. The premature estrus was defined as one displayed by animals on any day between day 0 (GnRH injection) and day 10 (before $PGF_{2\alpha}$ injection). The animals showing premature estrus were not treated with $PGF_{2\alpha}$ and served with fertile buffalo bull. The conception rate was defined as the proportion of animals that became pregnant from those detected in estrus and served. The pregnancy rate was defined as the proportion of animals that became pregnant from amongst assigned to treatment (Burke *et al.*, 1996). Pregnancy diagnosis was carried out through examination per rectum between days 50 and 60 post-breeding. The conception and pregnancy rates were recorded and compared with those of control animals. The subsequent reproductive performance of animals was recorded after pooling the data of responding and non-responding animals among treatment group (n=12). First postpartum estrus, calving to conception interval and number of services per conception were recorded and compared between animals of treatment and control group. t test was applied to test the level of significance between means of a variable in two groups of animals after checking the level of significance between pooled variances of a variable in two groups of animals through 'F' test.

The progesterone assay revealed that 5 and 2 animals were cyclic and remaining 7 and 4 animals were acyclic from treatment and control group, respectively. Among the cyclic animals, one animal exhibited premature estrus, while 2 animals showed synchronized estrus from animals of treatment group. Among acyclic animals, 2 animals showed premature estrus, while two animals exhibited synchronized estrus. Thus, three animals showed premature estrus, and 4 animals exhibited synchronized estrus from treatment group. One cyclic and two acyclic animals of control group exhibited spontaneous estrus during experiment period. The conception rate in animals of treatment group recorded in present study was 57.14% (4/7) and overall pregnancy rate was 33.3% (4/12). The corresponding figure were nearly similar in animals of control group, which recorded conception rate of 66.6% (2/3) and overall pregnancy rate of 33.3% (2/6).

The first postpartum estrus was recorded on an average of 74.5 ± 10.24 days postpartum among the animals of treatment group (n=12), while the corresponding figure for control group (n=6) was 59.33

± 7.92 days, the difference between two groups being non-significant. Similarly, calving to conception interval was recorded as 95.0 ± 12.10 and 77.0 ± 20.36 days for treatment and control group, respectively, with non-significant difference. Likewise, non-significant difference was recorded in number of services per conception (1.50 ± 0.24 vs. 1.50 ± 0.37) between animals of treatment and control group.

The synchronization of estrus was recorded in 4 (33.33%) animals at predetermined period of response between days 12 and 16 after beginning of estrus synchronization protocol. The present observation approximates with earlier reports in cattle (Mialot *et al.*, 1999) and buffaloes (Negalia *et al.*, 2003). The possible explanation for lower response in present study might be the expression of premature estrus (n=3) and use of acyclic animals in present study with postpartum interval of 35 days although 5 animals had plasma progesterone > 1.0 ng/ml suggesting that these animals were cyclic. Two acyclic animals displayed premature estrus on day 10 after GnRH injection in present study. Treatment with GnRH agonist induces the resumption of cyclic ovarian activity in postpartum anestrus cows (Twagiramungu *et al.*, 1992) and buffaloes (Shah *et al.*, 2002). However, spontaneous estrus was observed in control animals nearly in similar proportion as synchronized estrus displayed in animals of treatment group suggesting that estrus synchronization protocol is not much effective in inducing estrus during early postpartum period in water buffaloes. The conception and pregnancy rate obtained in present study was similar to previous studies reported in cycling buffaloes (Negalia *et al.*, 2003) suggesting that estrus synchronization protocol results in acceptable conception and pregnancy rate in anestrus lactating buffaloes during early postpartum period.

Three animals displayed premature estrus after GnRH treatment prior to administration of $PGF_{2\alpha}$ in present study. The incidence of premature estrus suggests a minimal degree of estrus detection regularly in conjunction with estrus synchronization programme if maximum pregnancy rates are to be achieved (Geary *et al.*, 2000; Stevenson *et al.*, 2000). The present experiment was conducted during breeding season when response to exogenous GnRH-$PGF_{2\alpha}$ was expected to be comparatively better than lean season. The present estrus synchronization protocol was initiated on day 35 postpartum and $PGF_{2\alpha}$ was administered on day 45 postpartum. Therefore, animals were expected to show synchronized estrus between days 47 and 50 postpartum. The design of experiment was slightly modified with timing of $PGF_{2\alpha}$ administration, which was injected on day 10 in the present study, instead of standard practice of injecting $PGF_{2\alpha}$ between days 6 and 8 after first GnRH injection on day 0. Timing of $PGF_{2\alpha}$ administration was changed with the viewpoint that some animals may display premature estrus prior to prostaglandin treatment and to see the possibility of deciding the voluntary waiting period for breeding around day 50 postpartum on the farm. However, almost similar conception and pregnancy rates were recorded in animals of treatment and control group. Likewise, non-significant differences were observed in subsequent reproductive performance with respect to occurrence of first postpartum estrus, calving to conception interval and number of services per conception between animals of treatment and control group. The present observation suggests that application of estrus synchronization protocol during early postpartum period is not beneficial to improve the subsequent reproductive performance in water buffaloes.

From the present study, it is concluded that estrus synchronization programme resulted in acceptable conception and pregnancy rates in anestrus lactating buffaloes during early postpartum period; however, it is not beneficial for improving the subsequent reproductive performance of water buffaloes.

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