A STUDY ON PUERPERAL EVENTS AND POSTPARTUM REPRODUCTIVE PERFORMANCE IN GIR COWS

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Received 11-12-2011 Accepted 22-2-2012

ABSTRACT

This investigation was undertaken on 24 normal parturient Gir cows of 2nd to 4th parity on an organized farm to evaluate the puerperal events and postpartum fertility with and without use of estrus induction / synchronization protocols (viz., CIDR, Ovsynch and Cosynch) around day 90-92 postpartum in anoestrus/suboestrus cows. Per rectal palpation was carried out periodically during early postpartum period to monitor ovarian changes and uterine involution, and around day 70-90 at 10 days intervals to confirm anoestrus/suboestrus condition. The plasma progesterone levels were estimated by RIA at 10 days interval from calving till 140 days postpartum. The birth weight of calf, time required for expulsion of fetal membranes and weight of expelled fetal membranes were 19.08 ± 0.84 kg, 4.67 ± 0.46 hrs and 3.06 ± 0.19 kg, respectively. Complete uterine involution was noted in Gir cows by mean interval of 36.54 ± 0.68 (range 31-42) days postpartum. The interval for occurrence of first estrus postpartum clinically and through plasma progesterone profile was 94.29 ± 2.24 (range 70-101) and 65.42 ± 5.77 (range 20-101) days, respectively ($P<0.05$). The first service and overall conception rates obtained were 41.66 per cent (10/24) and 87.50 per cent (21/24) within 150 days postpartum. The fertility response to all three estrus synchronization treatments used in anoestrus/suboestrus cows was at par with that of the normal cyclic cows in the same herd.

KEY WORDS: Gir cows, Puerperal events, Plasma progesterone, Estrus synchronization, Fertility.

INTRODUCTION

In India, the Zebu population primarily consists of well-known dairy, draft and dual purpose (milch + draft) breeds. Gir are amongst the hardiest of high yielders in the world (Kumar and Singhal, 2006). In their native habitats, they are regarded as well adapted animals with high production potentials, but with extended prepubertal and postpartum anoestrus/suboestrus periods. Fertility of the cow in the months following calving and thereby economic return depends on satisfactory involution of uterus and re-establishment of cyclical ovarian activity (Kamal, 2010). Conception rates in lactating cows are related positively to concentration of progesterone in blood during the estrous cycle preceding the service. Researchers have made tremendous strides in developing numerous protocols such as Ovsynch, Cosynch, Heatsynch, CIDR etc. to control the estrous cycle and improve reproductive efficiency in anoestrus/suboestrus dairy animals. The available literature on the puerperal events and postpartum fertility without and with estrus synchronization regimens is meager in Gir cows under their native agro-climatic conditions, and hence this study was attempted to delineate these aspects in Gir cows of an organized farm in Anand.

MATERIALS AND METHODS

The present investigation was carried out on 24 normal parturient Gir cows of 2nd to 4th parity at Livestock Research station, AAU, Anand (middle Gujarat) during the year 2010-11 to evaluate puerperal events and postpartum fertility without and with use of estrus synchronization protocols

(viz., CIDR, Ovsynch and Cosynch) initiated around day 90-92 postpartum in anoestrus/suboestrus cows. The sex and birth weight of calves as well as the time required for expulsion of placenta and placental weight were recorded. Uterine involution and initiation of ovarian activity was assessed initially by per rectal palpation of each animal at five days interval from day 20 to 40 postpartum. Subsequently, the reproductive/ovarian status was assessed by per rectal palpation of the genitalia on three occasions, each at 10 days interval beginning at day 70 postpartum in cows not expressing behavioural estrus. Cows were inseminated only after 60 days of calving, if found in estrus. The estrus synchronization treatments, viz., CIDR, Ovsynch and Cosynch were initiated at random around day 90-92 postpartum in anoestrus/suboestrus cows, with fixed time AI using good quality frozen-thawed semen. The findings on gynaeco-clinical examinations as well as estrus and fertility response to various treatments were recorded till day 150 postpartum.

Blood samples were collected from the jugular veins at 10 days intervals from calving till 140 days postpartum with two additional samples on day of initiation of treatment (day 90-92), day 7 of treatment (day 98-99) and on day of induced estrus & AI (day 100-102 postpartum) for estimation of plasma progesterone concentrations by RIA technique. The data generated were analyzed statistically using CRD and 't' test (Snedecor and Cochran,1994).

RESULTS AND DISCUSSION

Placental Expulsion Time, Placental Weight and Birth Weight of Calf

The average birth weight of calf, time required for expulsion of fetal membranes and the weight of expelled fetal membranes in Gir cows were 19.08 ± 0.84 kg, 4.67 ± 0.46 hrs and 3.06 ± 0.19 kg, respectively (Table 1). There was no significant effect of sex of calf on these traits. Moreover, the sex ratio of male to female birth also did not differ significantly. The three traits studied with respect to mean values and effects of sex of calf were in accordance with the values and trend documented in literature for the Gir breed (Gaur *et al.*, 2003; Anonymous, 2010).

Postpartum Reproductive Performance of Gir Cows

The Gir cows under study revealed complete uterine involution by mean interval of 36.54 ± 0.68 (range 31-42) days postpartum. There was no significant difference between four groups for this trait. The mean interval for occurrence of first estrus postpartum clinically and through plasma progesterone (P4) profile was 94.29 ± 2.24 (range 70-101) and 65.42 ± 5.77 (range 20-101) days, respectively ($P<0.05$) (Table 2). The concentrated values of estrus cows seen around day 100 in Figure 1 were attributed to induced estrus, where both plasma P4 profile and behavioural signs of estrus coincided in most of the animals. Significantly longer interval for first estrus postpartum noted clinically was due to the fact that many of the animals (14/24) ovulated silently at least once, before being taken up for treatment or AI, and that most of the treated cows exhibited synchronized estrus almost at the same time on day 99 to 102 postpartum.

The onset of ovarian activity during postpartum period is a complex phenomenon, which constitutes the uterine involution, regression of pregnancy CL and resumption of ovarian follicular activity. A delay in the resumption of ovarian activity postpartum is one of the important factors contributing to prolonged calving to conception interval in dairy animals. In the present study, the time taken for uterine involution and resumption of ovarian activity were in agreement with the values recorded in cows by Mc Dougall *et al.* (1995), Sheshappa *et al.* (2002) and Patel *et al.* (2005). However, a relatively shorter uterine involution time of 27.2 ± 1.4 and 26.6 ± 1.6 days in normally calved Jersey and Holstein cows, and of 31.12 ± 0.93 days in Surti buffaloes has been reported by Peiris *et al.* (1982) and Khasatiya *et al.* (2006), respectively. The delayed uterine involution is usually associated with abnormal calving and genital infection and inflammation leading to failure of timely regression of pregnancy corpus luteum and resumption of postpartum ovarian activity (Peiris *et al.,* 1982).

It is well established that calving to conception interval (service period) and overall conception rate are the most useful overall measures of reproductive performance. In the present study, few animals

Table 1. Effect of sex of calf on birth weight of calf, placental expulsion time and weight of placenta in Gir cattle (Mean± SE)

Sex of calf	No. (%)	Birth weight of calf (kg)	Placental expulsion time (hrs)	Weight of placenta (kg)
Male	11 (45.83)	19.89 ± 0.97	4.89 ± 0.41	3.27 ± 0.21
Female	13 (54.17)	17.90 ± 1.16	4.37 ± 0.63	2.94 ± 0.28
Overall	24 (100.00)	19.08 ± 0.84	4.67 ± 0.46	3.06 ± 0.19

Table 2. Postpartum reproductive performance of Gir cows without and with estrus synchronization treatments at day 90-92 postpartum (Mean ± SE)

Puerperal events/ Reproductive Traits	Normal Cyclic Control(6)	Synchronization treatments			Overall Total (24)
		CIDR Protocol(6)	Ovsynch Protocol(6)	Cosynch Protocol(6)	
Uterine Involution (Days)	35.66 ±1.31	36.83 ±1.74	37.00 ±1.29	36.66 ±1.36	36.54 ±0.68
First Estrus PP by Plasma P_4 (Days)*	41.66 ±7.03	74.66$^{\$}$ ±11.99	81.83$^{\$}$ ±9.17	63.50$^{\$}$ ±12.39	65.42 ±5.77
First Estrus PP Clinically (Days)**	76.33 ±2.29	99.83# ±0.40	100.50# ±0.56	100.50# ±0.62	94.29 ±2.24
Service Period or Days Open	91.80 ±6.04	107.80# ±4.60	113.00# ±8.88	116.66# ±6.18	107.76 ±3.71
No. of AI per Conception	1.80 ±0.37	1.40 ±0.24	1.60 ±0.40	1.83 ±0.31	1.66 ±0.16
First Service Conception Rate (%)	33.33 (2/6)	50.00 (3/6)	50.00 (3/6)	33.33 (2/6)	41.66 (10/24)
Overall CR, 3 cycles (%)	83.33 (5/6)	83.33 (5/6)	83.33 (5/6)	100.00 (6/6)	87.50 (21/24)

Figures in parentheses indicate number of animals; * P <0.05, ** P <0.01;
$^{\$}$Only 2-3 animals showed evidence of ovarian cyclicity by elevated Plasma P_4 before initiation of synchronization treatments on day 90 postpartum. # includes induced estrus cows 90 days postpartum.

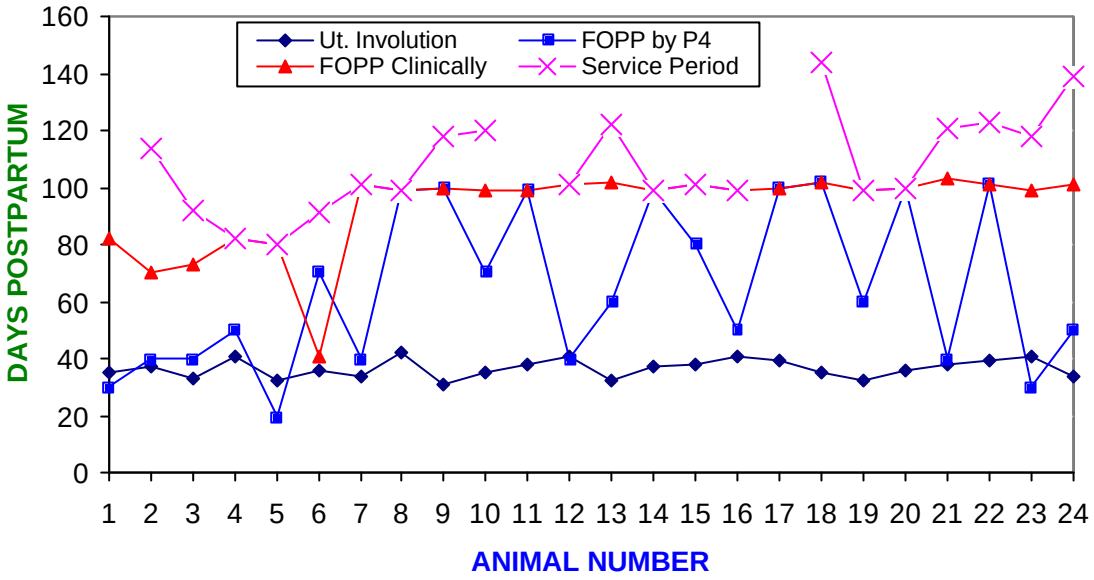

Figure 1 : Observations on uterine involution, first estrus postpartum clinically and by plasma P_4 and service period of individual Gir cows under control (An No. 1-6) and different treatment groups (An No. 7-24)

ovulated silently, while others remained anoestrus till day 90 postpartum (Fig. 1). This could be possibly due to suckling effect or mothering instinct, and that Gir animals are slow breeders with delayed and poor estrus expression postpartum compared to exotic and crossbred cows (Abeygunawardena and Dematawewa, 2004; Anonymous, 2010). In the present study, control group of normal cyclic cows (An No. 1-6) had significantly shorter interval for first estrus postpartum compared to treated groups, as evident through clinical manifestation of estrus signs and plasma progesterone profile (Fig. 1). However, almost similar values observed for postpartum interval to first estrus, both by plasma P4 assay and clinically in other animals (7-24), were due to better estrus synchronization induced by hormonal therapies around day 90 postpartum in all three treatment groups. Because of this fact only, the service period and number of AIs required per conception were also similar in all 3 groups (Table 2).

The overall first service conception rate obtained at spontaneous / induced estrus was 41.66 % (10/24) among 24 Gir cows. Nine and two more cows conceived among treated groups with 2nd and 3rd estrus/AI, respectively, giving overall conception rate of 87.50 % (21/24) within 150 days postpartum. The first service or overall conception rates were apparently not much different between control and three treatment groups (Table 2, Fig. 1). Similar results have also been reported by some earlier workers with same estrus induction protocols in cows (Aali *et al.,* 2008; Bhoraniya *et al.,* 2012) and buffaloes (Zabeel *et al.,* 2009; Naikoo et al., 2010). Further, Khasatiya *et al.* (2006) and Patel *et al.* (2007) noted significantly earlier onset of first estrus postpartum with better first service conception rate after administration of GnRH or PGF2α on day 40-49 postpartum in Surti buffaloes and HF cows, respectively, as compared to untreated groups.

The cows under study were hefty, physically sound with body condition score of 3 to 3.5 weighing 400 to 450 kg at parturition, but lost lot of weight amounting to 45-60 kg within a fortnight and further continued to loose weight inspite of routine feeding till 2 months postpartum, where majority of them were reduced to leanness with body condition score of around 2 to 2.5 only. Many of these cows had expressed 1 or 2 cycles by this time, but then suffered from anoestrus condition almost

throughout the lactation, unless induced to estrus. However, the cows that conceived either early or late showed improvement in body condition of their own due to anabolic effect of progesterone secreted from the corpus luteum, which gets built up in the circulation with liberation of large amount of P4 continuously by CL of pregnancy.

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