Studies on Puerperal Events and Reproductive Efficiency Following Hormone Therapy at Day 42 Postpartum in Surti Buffaloes


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

1Corresponding author’s e-mail: dhami_1659@yahoo.com

ABSTRACT

A study was carried out on 59 normally calved postpartum Surti buffaloes of University farm over first 105 days postpartum without and with GnRH and PGF₂α treatment on day 40 - 42 with a view to improve their reproductive efficiency. All the animals were periodically palpated per rectum to monitor uterine and ovarian changes and related reproductive peridata. Buffaloes were identified through rectal palpation as having suboestrus condition (29) or inactive ovaries (30) by day 40 - 42 postpartum. Eighteen suboestrus buffaloes were then treated with single i/m injection of 5 mL Lutalyse (PGF₂α) keeping 11 animals of same status as control. Similarly, other 18 buffaloes with inactive ovaries were treated with single i/m injection of 5 mL Receptal (GnRH analogue) on day 40 - 42 postpartum and 12 animals of same status were kept as control. The results revealed that the regression of pregnancy CL and uterine involution were complete by day 9.39±0.27 and 31.22±0.93 postpartum without group differences. However, the resumption of ovarian activity (52.75±9.07 day) and first oestrus postpartum (78.80±6.29 days) were earlier in both GnRH and PGF₂α treated conceived than control conceived buffaloes. The service period averaged 91.85±7.06 days and calving interval 402.02±7.07 days; both were shorter by 1 cycle in GnRH treated conceived than the control conceived buffaloes (69.93±4.29 vs 87.71±4.00 & 380.36±4.02 vs 400.28±3.97 days), but not in PGF₂α treated and control conceived group (59.73±3.76 vs 61.20±10.87 & 369.13±3.80 vs 373.00±10.33 days). The response to treatment at day 40 - 42 postpartum was excellent, as 88.88% (16/18) of GnRH treated buffaloes responded and came in oestrus by mean interval of 19.21±1.03 days and 77.77% (14/18) of them conceived as against 58.33% (7/12) conception rate with a mean oestrus interval of 32.14±9.03 days in control group. In PGF₂α treatment group also, 83.33% (15/18) treated buffaloes responded with mean interval of 4.07±0.53 days post-treatment and all of them conceived, in contrast to 45.45% (5/11) buffaloes conceived with a mean oestrus interval of 13.4±6.76 days in PGF₂α control group. The first service conception rate was above 70% in both the treatment groups. Hence, both the drug-dose regimes may be recommended for routine use to enhance postpartum reproductive efficiency of buffaloes and thereby economic return.

Key Word: Surti buffalo; Puerperal events; Reproductive efficiency; Hormonal therapy; Postpartum

INTRODUCTION

In recent years, routine preventive procedures have been developed to optimize and maintain a high degree of breeding efficiency in dairy herds. All the buffaloes and cows under such programs are usually examined routinely at approximately 25 - 30 days after calving to determine the degree of ovarian activity and uterine involution and changes in the reproductive tract that has as early as occurred since parturition. Frequent examinations may be carried out during the course of postpartum phase on buffaloes and cows with any abnormalities in the genital discharge, oestrus rhythm and in those that suffered from anoestrus, suboestrus or repeat breeding to arrive at an accurate early diagnosis and implement proper therapy. It has been now in vogue to administer GnRH and/or PGF₂α in early postpartum cows and buffaloes in order to hasten early resumption of cyclic ovarian activity and thereby to increase the reproductive efficiency (Abdoul-Ela et al., 1985; Armstrong et al., 1989; Barkawi et al., 1995; Shah et al., 2002). The present study was, therefore, focused to evaluate the postpartum reproductive performance of suckled Surti buffaloes through clinical diagnosis and to see the response to hormone GnRH and PGF₂α alpha therapy at day 40 - 42 postpartum.

MATERIALS AND METHODS

This study was carried out on 59 normally calved postpartum Surti buffaloes of University farm, Navsari (Gujarat). All the animals were fed green fodder, hay, compounded concentrate and mineral mixture as per the standard feeding schedule on the farm. They were monitored by weekly rectal palpation for detection of uterine involution and resumption of ovarian follicular activity postpartum. During the course, 29 buffaloes were
identified as having suboestrus condition and 30 with inactive ovaries at day 40 - 42 postpartum. Eighteen suboestrus buffaloes were then treated with single i/m injection of 5 mL Lutalyse (PGF$_{2\alpha}$) keeping 11 animals of same status as control. Similarly, other 18 buffaloes with inactive ovaries were treated with single i/m injection of 5 mL Receptal (GnRH analogue) on day 40 - 42 postpartum and 12 animals of same status were kept as control. Oestrus occurrence was detected daily in these animals after day 40 postpartum with the help of teaser bull parading in the morning and evening. The animals detected in oestrus were bred by natural service and were palpated per rectum for pregnancy 45 - 60 days post partum. The data on puerperal events, oestrus response, breeding, conception and related peridata were recorded till 105 days postpartum, and were analyzed statistically (Steel & Torrie, 1981).

RESULTS AND DISCUSSION

The overall findings on postpartum reproductive performance of all 59 animals, irrespective of treatment, as well as of those buffaloes that conceived within 105 days postpartum with and without GnRH and PGF$_{2\alpha}$ treatment on day 40 - 42 postpartum are presented in Table I and Fig. 1.

Regression of pregnancy corpus luteum and uterine involution. The pregnancy CL was found regressed completely by a mean of 9.39±0.27 (range 5 to 15) days postpartum. This compared well with the reports of Jainudeen et al. (1981) and Shah (1999) in suckled Swamp and Surti buffaloes, respectively. However, early regression of pregnancy CL within 4 - 7 days postpartum has been reported by Devraj and Janakiraman (1986) in Surti buffaloes, though in few cases regression occurred up to 15 days postpartum, as has been seen in the present study. On the other hand, some workers (Usmani et al., 1985; Chaudhary et al., 1989) have shown variable and delayed regression of pregnancy CL by 17 - 20 days postpartum. The CL of pregnancy usually stops secreting progesterone some 30 - 40 h before parturition. Moreover, a huge quantity of luteolytic prostaglandin released from the cotyledons during and immediately after the process of parturition is involved in this fast regression of pregnancy CL. The findings on complete regression of pregnancy CL in the present study was supported by the basal concentration of plasma progesterone observed within 7 - 14 days postpartum in most of the animals (Khasatiya et al., 2004). There was no significant difference in the time interval for regression of pregnancy CL between treated and control-conceived buffaloes of either GnRH or PGF$_{2\alpha}$ group.

The period of uterine involution in Surti buffaloes under study was 31.12±0.93 (range 19 to 47) days (Table I). This was in close agreement with the reports of Chaudhary et al. (1987) in Nili-Ravi buffaloes. Shah (1999) however, found it as 24.75±1.27 days in Surti buffaloes, and Dhanani et al. (1988) found it as 24.75±1.27 days in Surti buffaloes, and Kundi buffaloes. This variation observed by different workers could be attributed to the breed of animals, effect of suckling or non-suckling, season of calving, nutritional status, and endocrine balance. The periods for uterine involution in groups of GnRH conceived and PGF$_{2\alpha}$ conceived (treatment vs control) buffaloes were 27.79±1.35 vs 28.57±1.04 and 32.27±1.97 vs 32.00±2.86 days, respectively (Table III). The animals of PGF$_{2\alpha}$ group on an average took some 4 days more for complete uterine involution in comparison to GnRH group, but the difference was not significant.

Resumption of follicular activity and first oestrus postpartum. The interval for resumption of postpartum follicular activity (characterized by follicular growth, ovulation and CL formation) found as 52.79±4.07 days with a range of 14 to 148 days was longer than 26 - 27 days reported by Chaudhary et al. (1989) in non-suckled Murrah buffaloes and Shah (1999) in suckled Surti buffaloes. Further our findings on resumption of ovarian activity in 70 - 75% of buffaloes between day 25 and 55 postpartum confirmed the report of Bongso and Jainudeen (1982) in Swamp buffaloes and of Shah et al. (2002) in Surti buffaloes. Jainudeen et al. (1983) observed it to be delayed up to 88±26 days postpartum in suckled swamp buffaloes. Studies of Tiwari (1989) in Surti buffaloes proved that suckling does not have any effect on serum FSH concentration as follicular development was initiated by approximately same time in postpartum suckled and non-suckled groups.

The mean interval from calving to first oestrus postpartum was 78.80±6.29 (range 25 to 350) days in buffaloes under study. These findings corroborated with the report of Devraj and Janakiraman (1986), Usmani et al. (1985) and Shah et al. (2002). However, some previous workers have reported much delay in first oestrus postpartum and ovulation in suckled buffaloes (El-Sheikh & Mohamed, 1976), while others reported it to be much earlier (28 - 38 days) (Tiwari & Pathak, 1995; Takkar et al., 1999). In the present study, GnRH treated conceived buffaloes resumed ovarian activity on an average by day 53.14±1.19 postpartum, which was also 3.5 days earlier than day 56.86±4.92 in untreated conceived buffaloes. However, this difference for PGF$_{2\alpha}$ treated and control conceived buffaloes was wider (26.13±1.99 vs 38.20±9.89 days) yet not significant. The mean interval for first postpartum oestrus in GnRH and PGF$_{2\alpha}$ (treatment & control) conceived buffaloes was 60.29±1.05 vs 79.86±3.34 and 49.27±2.41 vs 53.80±10.59 days, respectively, but did not differ significantly.

Conception rate, service period and calving interval. Out of 59 buffaloes, 41 conceived within 105 days postpartum giving conception rate of 60.51%. Majority of buffaloes (73.17%; 30/41) conceived with only one natural service, 24.39% (10/41) with 2 services and one animal (2.44%) took 3 services. The remaining all animals were also
persuade continuously till all of them conceived giving cent % conception rate. Thus overall, 100% animals conceived over a period of 411 days requiring 1.36±0.08 services per conception (Table I). Further, out of total 59 animals studied, the frequency of buffaloes that conceived within 60 days; between 61 - 80, 81 - 105, 105 - 140 days, and above 140 days postpartum breeding policies adopted in different areas of the country. In present study, the mean service period for non-suckled buffaloes was 411 days postpartum leading to extended overall service period as 40 to 228 days. In non-suckled buffaloes (Table I). It is evident from the Table that in GnRH treated group service period and thereby calving interval was shortened by one cycle than that of control, but in PGF\textsubscript{2α} group no such difference was found. The prolonged service period and thereby calving interval, in non-conceiving group might be due to delay in maturation of follicles with viable oocytes, increased services per conception and higher percentage of early embryonic death in comparison to conceive buffaloes. Further somewhat less service period in treated conceived rather than control conceived group might be due to treatment effect, which initiated early resumption of ovarian activity from dormant or silent status and helped in settling the animals earlier.

### Correlation coefficients (r) of reproductive traits

In the present study, reproduction of pregnancy CL had negative correlations with P\textsubscript{4} and positive correlation with all reproductive traits in PGF\textsubscript{2α} treatment group. Similarly, uterine involution showed positive correlation with service period and calving interval in GnRH group and with uterine involution in PGF\textsubscript{2α} group, but in GnRH treatment group it had significant positive correlations with all reproductive traits. The intervals for postpartum first oestrus, service period and calving interval including number of services per conception were highly significantly \((P < 0.01)\) and positively interrelated among themselves \((r = 0.27 \text{ to } 0.99)\) in both the groups. These findings to some extent corroborated with those of Shah (1999) in Surti buffaloes. In cows, the regression of pregnancy CL was found related to uterine involution and simultaneous reappearance of follicular activity, which progressed to ovulation (Morrow et al., 1968). Suthar and Kavani (1992) however, did not find any relationship between rate of uterine involution and postpartum oestrus in Mehsani buffaloes.

#### Fertility management using hormone therapy (on day 40 postpartum)

As regards response to GnRH treatment, 88.88\% (16/18) of treated buffaloes responded and came in oestrus by mean interval of 19.21±1.03 days and 77.77\% of them (14/18) conceived, in contrast to GnRH control group, where 58.33\% buffaloes (7/12) conceived with a mean oestrus interval of 32.14±9.03 days from schedule date
FERTILITY MANAGEMENT IN POSTPARTUM BUFFALOES USING HORMONE THERAPY / Int. J. Agri. Biol., Vol. 8, No. 1, 2006

Table I. The difference was found to be significant suggesting the beneficial effect of GnRH treatment on day 40 - 42 postpartum. Of the 77.77% GnRH treated buffaloes that conceived by 105 days postpartum, 11.11% conceived within 60 days, 50.00% buffaloes conceived between 61 - 80 days and 16.66% between 81 - 105 days postpartum (Fig. 1). The corresponding figures for 58.33% buffaloes that conceived in GnRH control group were 00.00, 16.66 and 41.67% (Fig. 1). The remaining 22.23% buffaloes (4) of GnRH treatment group and 41.67% (5) of control group did not respond to treatment/did not conceive till 105 days postpartum.

In PGF$_2$α group, 83.33% (15/18) treated buffaloes responded with normal oestrus signs at a mean interval of 4.07±0.53 days post-treatment and all of them conceived, in contrast to PGF$_2$α control group, wherein 45.45% buffaloes (5/11) conceived with a mean oestrus interval of 13.40±6.76 days from schedule date. The difference was significant for both the traits, the values being better in PGF$_2$α treated conceived than control conceived buffaloes (Table I). Of the 83.33% conceived buffaloes, 44.44% conceived within 60 days postpartum, 33.33% between 61 - 80 days and 5.56% between 81 - 105 days postpartum; whereas amongst PGF$_2$α control conceived buffaloes (45.45%), the corresponding values were 27.27, 9.09 and 9.09% for the three periods. The remaining 16.67% buffaloes (3) in treatment group and 54.55% (6) in control group took longer time to respond/conceive (Fig. 1).

The number of services per conception in GnRH/PGF$_2$α treated conceived groups was apparently lower than their control conceived groups (1.14±0.10 vs 1.43±0.30 & 1.33±0.13 vs 1.40±0.24). Moreover, the behavioural signs of induced oestrus by GnRH and PGF$_2$α treatment were as good as those occurred naturally. These findings of the experiment (treatment vs control group) indicated that prolonged postpartum ovarian inactivity and suboestrus are the major causes of lengthening the service period in suckled buffaloes and use of GnRH and PGF$_2$α in such situations, respectively significantly shortened the length of open days and has promising value to curtail the inter-calving interval to the economic milieu.

The present encouraging response of buffaloes (88.88%) to GnRH treatment is consistent with the findings of Abdoul-Ela et al. (1985) and Barkawi et al. (1995) in Egyptian buffaloes and of Shah et al. (2002) in Surti buffaloes. Moreover, the response of buffaloes to GnRH in present study was better than that reported by Pattabiraman et al. (1986), who induced oestrus by administering GnRH (500 µg i/m) as early as 20 - 25 days postpartum and noted 80% oestrus within 17.3 days in treated vs 40% within 31.5 days in control buffaloes, with corresponding conception rates of 37.5 and 33.3%, respectively. Similarly, Takkar et al. (1999) also found little better service period (114.8 vs 119.3 days) and conception rate (50 vs 38%) in buffaloes treated with GnRH at 30 days postpartum. Abdoon et al. (1994) observed induced oestrus in 80 – 83% of buffaloes with 200 µg of GnRH analogue within 4.5±1.69 days of treatment, which was much earlier than our findings. The beneficial effect of GnRH in early resumption of ovarian activity in present study is attributed mostly to the appropriate dose of GnRH as well as time of treatment when actually the animals come back to normal from the

---

**Fig. 1.** Percentage of animals conceived at different intervals postpartum overall and with or without GnRH & PGF$_2$α treatment on day 40-42 postpartum

Conception Rate: Overall 59 animals

- GnRH Treatment Group (n=18)
  - < 60 D: 16.66%
  - 61-80 D: 41.67%
  - 81-105 D: 44.44%
  - > 105 D: 41.67%

- GnRH Control Group (n=12)
  - < 60 D: 16.66%
  - 61-80 D: 33.33%
  - 81-105 D: 44.44%
  - > 105 D: 33.33%

- PGF$_2$α Treatment Group (n=18)
  - < 60 D: 27.28%
  - 61-80 D: 27.27%
  - 81-105 D: 27.27%
  - 105-140 D: 9.09%
  - > 150 D: 9.09%

- PGF$_2$α Control Group (n=11)
  - < 60 D: 27.28%
  - 61-80 D: 27.27%
  - 81-105 D: 27.27%
  - 105-140 D: 9.09%
  - > 150 D: 9.09%
stress of calving and puerperium. However, many previous workers noted that the results of GnRH treatment in suckling buffaloes/cows were not promising enough. This may be due to either low dose utilized or the time of treatment that differed (40 - 100 µg Britt et al., 1974; 12 µg Abdoul-Ela et al., 1985; 50 µg Barkawi et al., 1995). Similarly higher dose of GnRH (500 µg i/m) used by Pattabiraman et al. (1986) did not give encouraging result.

The promising response of buffaloes to PGF$_2$α treatment seen in our study was, however, in contrast to the findings of Morton et al. (1992). Lindell and Kindahl (1983) reported that exogenous administration of 25 mg PGF$_2$α twice daily on 3 to 12 days postpartum hasten uterine involution in cows. On the contrary, Nazir et al. (1994) found significantly shortened period for uterine involution and the interval from calving to first oestrus postpartum in Nili-Ravi buffaloes treated with PGF$_2$α (500 µg cloprostenol) on day 7 after parturition. Shah (1999) suggested that PGF$_2$α treatment on day 10 postpartum had no beneficial effect on uterine involution or reproductive performance in Surti buffaloes, but GnRH administration on day 40 postpartum significantly improved their reproductive efficiency.

Our observations show that the animals under study had optimum reproductive efficiency under the prevailing management strategies of the farm. The overall fertility status of buffaloes at the end of experiment revealed that irrespective of PGF$_2$α treatment nearly 45.45% suboestrous buffaloes conceived within 105 days postpartum. Among the remaining 54.55% buffaloes, 27.27% conceived between 105 - 140 days, 9.10% between 140 - 154 days postpartum, and 2 animals (18.18%) turned into dead anoestrus and conceived at 181 and 411 days postpartum (Fig. 1).

The extension of service period or days open observed in buffaloes of both GnRH and PGF$_2$α control-conceived groups agree with the report of Barkawi et al. (1995) in Egyptian buffaloes. The long sustained inactive ovarian period was attributed most likely to the inhibitory effect of suckling on the LH secretion, which is necessary to evoke the ovarian cyclicity (Peters et al., 1981). Regarding oestrous intensity following GnRH treatment, Pattabiraman et al. (1986) noticed moderate to mild signs of oestrus in 85% of Receptal treated buffaloes. Barkawi et al. (1995) also observed poor signs of heat in GnRH treated buffaloes. This suggests that intense manifestation of oestrus was not a common feature in Receptal treated cows and buffaloes. However, no acceptable reason was elucidated to this failure, and determination of endocrine changes during peri-oestrous period was stressed to evaluate this phenomenon. However, in our study almost all treated animals evinced intense to normal oestrus behaviour and could be bred and made pregnant in time.

It was concluded that treatment with GnRH has a good therapeutic value to enhance postpartum ovarian activity and conception in suckling buffaloes under the present drug-dose regime. Similarly, PGF$_2$α treatment initiated at 40 - 42 days postpartum, when uterine involution is normally completed, also definitely enhanced the reproductive efficiency of postpartum suboestrous buffaloes (CR 83.33 vs 45.45%) and hence both the drug regimes are recommended for use in postpartum suckling buffaloes to enhance their fertility and achieve shorter calving interval of economic significance.

Acknowledgement. We thank Research Scientist and Head, Livestock Research Station, GAU, Navsari and his staff for permitting us and extending full cooperation in taking up this work on their animals. The funds and facilities extended by Director of NATP, New Delhi, through sanction of the NATP project “Improving Reproductive Efficiency of Cattle and Buffaloes Under Irrigated Agro-Eco System” in the Gynaecology Department, GAU, Anand, is also gratefully acknowledged.

REFERENCES


136
Advanced Reproduction Technology for Mgmt of Fertility in Livestock, held at Veterinary College, Anjora, Durg Dec 14–6, India


*(Received 20 July 2005; Accepted 01 November 2005)*