EFFECT OF SUPPLEMENTATION OF CONCENTRATE AND MINERALS, GnRH AND PGF$_{2\alpha}$ ON POSTPARTUM REPRODUCTION IN BUFFALOES

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ABSTRACT

A total of 107 advance pregnant buffaloes were studied for their postpartum fertility. Among the buffaloes studied, the incidences of anoestrus and sub-oestrus were found to be 15.74 and 15.74 per cent, respectively. The mean days of calving to first postpartum oestrus (FPPE) and service period for treatment groups: T-I (Concentrate and minerals supplementation), T-II (GnRH), T-III (PG) and IV (Control) group were found to be 52.70±1.85 (47.25 to 58.15), 76.18±3.14 (66.84 to 85.52), 62.94± 0.29 (range 53.60 to 72.28) and 115.96 ±7.25 (107.93 to 123.99), and 60.26±2.75 (53.62 to 66.89), 91.00±6.25 (85.86 to 109.34), 88.90±7.94 (range 74.52 to 103.28) and 112.24±2.75 (101.20 to 123.26), respectively, both parameters differing significantly ($p<0.01$) between groups. The overall per cent CRs and number of services per conception for treatment groups: T-I, T-II, T-III and control buffaloes were found to be 94.00, 76.47, 64.70 and 58.33, and 1.25, 3.27, 2.38 and 3.42, respectively, both differing significantly ($p<0.01$) between groups. It was concluded that there was a beneficial effects of pre- and post- partum concentrate and minerals feeding in the rural buffaloes in view of resumption of postpartum ovarian activity within the period of 55 days and conceived by 65 days. However, some of the animals still suffered with postpartum anoestrus and subestrus conditions, which could be settled successfully using GnRH and PG, respectively.

Key words: Postpartum anoestrus, Service period, Concentrates, Minerals, Buffaloes.

The economic viability of dairy herd is dependent upon normal reproduction in the farm animals. Reproduction is affected by various factors but the nutrition is key factor for bovine postpartum infertility (Butler *et al.*, 1981). For the best economic returns, the dairy cattle and buffaloes must achieve 12 and 13 to14 months calving intervals, respectively. The energy required to develop and ovulate a follicle, form a CL and to maintain an early pregnancy is minuscule compared with the other energy demands of lactating bovines. Energy balance reflects the difference between energy consumed and that spent for maintenance and milk production.

The duration of PPAI has been shown to be related to the interval to the maximum negative energy balance (Butler *et al.*, 1981). Severe negative energy balance is a primary cause of a delayed resumption of normal oestrous cyclicity in high yielding dairy bovines (Lucy, 2003). The concentrate supplementation before and/or after calving improves the postpartum reproductive performance of dairy animals (Chauhan and Singh, 1979; Noakes *et al.*, 2001). Since the information available on pre-partum feeding, especially in rural buffaloes are meager, an effort was made to study the effect of pre- and post- partum concentrate and minerals feeding on reproductive performance of buffaloes under rural conditions.

The present study was carried out on advanced pregnant buffaloes (n=107) selected and registered from three villages covered under milk shed area of the Sabarkantha District Co-Operative Milk Producers Union

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Ltd., Himmatnagar, North Gujarat. All the selected buffaloes were supplemented with Fenbendazole bolus 3.0 gm for deworming. The registered animals were monitored for two months pre- and post- partum for occurrence of peri-parturitional reproductive events, if any, as well as for evincing the first postpartum oestrus (FPPE). All the calved buffaloes were examined per-rectally two weeks postpartum for monitoring the uterine involution. Since a teaser bull was not available at village level, all the buffaloes were kept under visual observation for exhibition of oestrus and/or characteristics of vaginal discharge for 55-60 days postpartum. The buffaloes showing estrus signs were bred by AI and followed for subsequent fertility till the conception. The buffaloes showing no estrus until 7-8 weeks postpartum rectal examination were carried for assessing the ovarian activity. The buffaloes having CL on either of the ovary were treated with Inj. prostaglandin $F_{2\alpha}$ (Lutalyse, Pharmacia & Upjohn), whereas, the buffaloes having no CL or smooth ovaries were treated by Inj. GnRH (Receptal, Intervet International GmbH, Germany) for induction of oestrus. Thus treated animals were followed for exhibition of oestrus, breeding by AI and subsequent repeating to estrus and/or conception. So, the experimental animals were grouped in below four groups.

Treatment Group-I (T-I): The buffaloes (n=50) under this group were fed with additional supplementation of 2 kg concentrates per day, during the last 2 months pre-partum. The buffaloes were also supplemented with multi-mineral preparation, "Bolus Cyclomin-7" (Alved Pharma & Food Pvt. Ltd., Chennai) @ One bolus/week, orally, from the day of calving along with dewormer (before 3 months of calving and on the day of parturition). The buffaloes were observed for exhibition of oestrus, breeding by AI and subsequent repeating to estrus and/or conception.

Treatment Group-II (T-II): The buffaloes (n=17) under this group were fed with additional supplementation of 2 kg concentrates per day, during the last 2 months pre-partum. These buffaloes were also supplemented with multi-mineral preparation as well as dewormer as said above. Along with above inputs, animals having smooth, inactive ovaries on 60 days post-partum were treated with Inj. GnRH, 5 ml, IM (Buserelin, 0.02mg, "Receptal VET", Intervet International GmbH, Germany) for induction of oestrus. The animals treated were observed for exhibition of oestrus, breeding by AI and subsequent repeating to estrus and/or conception.

Treatment Group-III (T-III): The buffaloes (n=17) under this group were fed with additional supplementation of 2 kg concentrates per day, during the last 2 months pre-partum. These buffaloes were also supplemented with multi-mineral preparation and a dewormer as said above. Along with above inputs, the animals having CL on ovary on 60 days postpartum per rectal examination were treated with Inj. prostaglandin $F_{2\alpha}$, 5ml, IM (Dinoprost tromethamine, 25mg, "Lutalyse", Pharmacia & Upjohn). The animals treated were followed for exhibition of oestrus, breeding by AI and subsequent repeating to estrus and/or conception.

Control Group-IV (T-IV): The buffaloes(n=24) under this group were only given dewormer and no supplementation of any concentrates, but maintained only on the routine diet being offered by the owners comprising homely constituted/prepared food mixture with grains, viz., maize, wheat and cotton seed cake, etc. The animals under this group were only followed for all pre- and post- partum events, breeding and up to conception.

The data of the results obtained were suitably tabulated and analyzed statistically using one-way and two-way classifications of equal and unequal Completely Randomized Designs for testing the significance of differences between the various groups and periods, as per Snedecor and Cochran (1994). The means of these groups and periods were compared using critical difference (CD).

Among the rural buffaloes (n=84), being fed additional concentrates, @2.0 kg/day, and supplemented with multi-minerals, two months pre- as well as post- partum, 50 (59.52%) buffaloes (T-I) had a normal on set of postpartum ovarian activity (52.70 ±

1.85 days) as detected by visible estrus and confirmed by rectal examination. The remaining buffaloes (34) were found to be, on postpartum monitoring, evincing no exhibitory estrus up to day 60 postpartum, having either absolutely smooth/non-functional ovaries (n=17, 20.23%, true anoestrus; T-II) or a CL was found on either of the ovaries (n=17, 20.23%, suboestrus; T-III). The buffaloes under group T-I were bred by AI where as buffaloes under groups T-II and T-III were treated with GnRH and $PGF_{2\alpha}$, respectively, for induction of oestrus, with cent per cent estrus induction in both groups.

The mean days from calving to FPPE for rural buffaloes under T-I (Concentrates & minerals supplementation), T-II (GnRH), T-III (PG), and T-IV (Control) groups were observed to be 52.70 ± 1.85, 76.18 ± 3.14, 62.94 ± 0.29 and 115.96 ± 7.25, respectively, differing highly significantly ($p<0.01$) between groups, being the lowest in T-I and the highest in T-IV groups.

The mean FPPE interval (52.70 ± 1.85 days) observed in the buffaloes fed with concentrate and multi-minerals under T-I is supported by days observed to be 46.88 ± 3.37 days in Surti buffaloes by Shah (1999) and 51.17 ± 4.85 days in Mehsani buffaloes by Nakhashi (2006). The FPPE interval (76.18 ± 3.14 days) observed in T-II (GnRH) was comparatively higher than those reported by Pattabiraman *et al.* (1986), (17-33 days); Takkar *et al.* (1999), (37-43 days) and Shah *et al.* (2002), (54.83 days) in buffaloes. The mean FPPE interval for buffaloes under T-III (PG), which suffered from silent oestrus evincing no exhibitory estrus but had a palpable CL on either of the ovary, was 62.94 ± 0.29 days. Nazir *et al.* (1994) reported comparatively higher FPPE interval of 111 days in buffaloes.

The mean service period (days) for buffaloes under T-I (Concentrates & minerals supplementation), T-II (GnRH), T-III (PG), and T-IV (Control) groups were 60.26 ± 2.75 (53.62 to 66.89), 91.00 ± 6.25 (85.86 to 109.34), 88.90 ± 7.94 (range 74.52 to 103.28), and 112.24 ± 2.75 (101.20 to 123.26), respectively, differing highly significantly ($p<0.01$) between groups (Table 1), being the lowest for group T-I (Concentrates & minerals supplementation) and the highest for group T-IV (Control).

The mean service period (days) observed in the treated buffaloes under the study corroborated with the findings of 76.16 days (Tiwari and Gupta, 1995) in non-suckled Surti buffaloes. However, the present findings have been found to be comparatively lower than those reported to be 126 days (Takkar *et al.*, 1999) in Murrah non-suckled buffaloes, 104 days (Devraj, 1982) in Surti buffaloes, 125.61 days (Reddy *et al.*, 1986) for Murrah buffaloes, 243.81 (Chaudhary and Pasha, 1988) in Nili-Ravi buffaloes and 130.00 (Tiwari and Gupta, 1995) for suckled groups of Surti buffaloes.

During the study, in spite of feeding the buffaloes pre-partum and post-partum with additional concentrate and minerals, still some buffaloes failed to evince postpartum oestrus, either due to true anoestrus (n=17; 20.23%), or silent/suboestrus (n=17; 20.23%). Among the true anoestrus buffaloes (n=17) treated with Inj. GnRH (Group-II), all the buffaloes responded to treatment with the mean oestrus induction interval of 16.18 ± 3.14 day, whereas, from the subestrus buffaloes (n=17) treated with Inj. $PGF_{2\alpha}$ (Group-III), all the buffaloes also responded to treatment with the mean oestrus induction interval of 2.94 ± 0.29 (70.56 hrs) days. The per cent incidence of anoestrus in buffaloes (20.23) has been found to be considerably lower as compared to the incidences reported by Pandit (2004), (53.15); Hedaoo *et al.* (2006), (41.40); Raju *et al.* (2007), (55.79); Sunder *et al.* (2007), (48.6) and Taraphder *et al.* (2007), (28.62) in buffaloes, suggestive of positive effect of steaming up of buffaloes in reducing the incidence of postpartum anoestrus. The per cent incidence of suboestrus (20.23) observed in present study was comparatively lower than the findings of Pant and Singh (1991), (28.90); Patel (1992), (67.54) and Singh *et al.* (2005), (25.86) in buffaloes.

The per cent CRs and the number of services per conception at Ist, IInd, IIIrd service and overall for buffaloes under T-I were 88.00 (44/47), 6.00 (3/47), 0.00 (0/47) and 94.00 (47/50), and 1.13, 1.19, 1.25 and 1.25. The respective per cent CRs and the number of services per conception for buffaloes under T-II (GnRH) were 52.94 (9/13), 11.76 (2/13), 11.76 (2/13) and 76.47 (13/17), and 1.89, 2.27, 2.38 and 2.38. The buffaloes under group T-III (PG) had these values to be 41.18 (7/11), 5.88 (1/11),

17.64 (3/11) and 64.70 (11/17), 2.42, 3.37, 3.27 and 3.27, whereas, the control buffaloes had respective values to be 45.83 (11/24), 8.33 (2/24) and 4.16 (1/24), and 2.18, 2.85, 3.42 and 3.42, respectively. The overall mean number services per conception for buffaloes under treatment Group-I, II, III and control were found to be 1.25, 2.38, 3.27 and 3.42, respectively, indicating favourable effect of pre- and post-partum concentrate and minerals feeding with significant reduction in number of service per conception in treated buffaloes as compared to control buffaloes. The present findings are supported by similar findings of Shah (1999), who reported higher number of services per conception for infertile (2.00±0.37) buffaloes in comparison to fertile group (1.33±0.14).

The first service per cent conception rates, for postpartum buffaloes under treatment groups- I, II, III and control buffaloes, were recorded to be 88.00 (44/50), 52.94 (9/17), 41.88 (7/17) and 45.83 (11/24) with the respective overall group wise per cent conception rates to be 94.00 (47/50), 76.47 (13/17), 64.70 (11/17) and 58.33 (14/24) (Table 4.4.5.2). The per cent pooled conception rate in treatment groups (I, II and III) 84.52 observed in present study is found to be comparatively higher than Group-IV (control), i.e., 58.33, which indicated the unquestionably beneficial/positive role of concentrates feeding and mineral supplementation on postpartum fertility. Based on the fertility results obtained, it is worth to surmise that hardly 45.83 buffaloes conceived under control group as compared to 88.00 per cent buffaloes conceived at the first AI, nearly doubled one, clearly pointed towards the beneficial role played by ante-partum steaming up and postpartum feeding of buffaloes resulting into fruitful pregnancy, with proportionately considerably lower number of inseminations/services required per conception to be 1.13 in comparison to 2.18 in control buffaloes.

During early lactation, increasing dietary intake fails to keep pace with rising milk production. The resultant negative energy balance and rate of mobilization of body reserves appear directly related to the postpartum interval to first ovulation and lower conception rate. Pre- and post- partum concentrates feeding considerably reduced the incidences of postpartum anoestrus and suboestrus conditions. The first postpartum oestrus and the fertile oestrus intervals could be reduced in the buffaloes supplied with compounded concentrates and minerals preparation as compared to buffaloes under control group. Thus, with ante- and post- partum feeding of advanced pregnant buffaloes and buffaloes during their peak milk production, the dairy animals would settle with an ease at the earliest postpartum while passing through the peak milk production stress. However, some of the buffaloes still suffered from either true anoestrus or sub-oestrus conditions, could be resolved with good fertility through the use of GnRH and $PGF_2\acute{a}$ treatments in postpartum buffaloes, respectively.

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