

EFFECT OF MINERAL SUPPLEMENTATION ON INVOLUTION, POST-PARTUM OVARIAN ACTIVITY AND CONCEPTION RATE IN MARATHWADI BUFFALOES

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ABSTRACT

The present investigation was planned to study effect of mineral supplementation on involution, post-partum ovarian activity, post-partum oestrus and conception rate in 14 Marathwadi advance pregnant (after 10 month) buffaloes, maintained by farmers in the rural area adjacent to Parbhani town. Group-I were taken as (treatment group) those animals shown Ca and P level below normal range and Group-II were (control group) include those animals shown serum Ca and P level within normal range. Seven buffaloes were kept under each treatment. The buffaloes in group-I were provided with mineral supplement 50 gms before and after 7 day of parturition.

The average duration required for complete uterine involution was observed as (38.14±0.88, 41.71±1.78 days) while the post-partum estrus was (63.57±2.22, 69.86±2.52 days) from Group 1 and Group 2, respectively. In the present investigation the resumption of ovarian activities in the buffaloes were 4th week (25-34 days) and 5th week (31-43 days) in Group 1 and Group 2, respectively. The conception rate in the present study was 85.71 percent and 71.42 percent from Group 1 and Group 2, respectively. It can be concluded from the present findings that the irrespective of statistical numerical significance there was decline average

days required for uterine involution and post-partum oestrus in treatment group as compare to control group. The early resumption of ovarian activities and conception rate was also higher in treatment group. Due to pre-partum dietary mineral supplementation, which resulted in prevention of post-partum disorders in treatment group of buffaloes.

Keywords: buffaloes, mineral, involution, post-partum oestrus, conception rate

INTRODUCTION

The Marathwadi buffaloes are reared largely in its native tract due to genetic potential for milk and adaptation to local environmental condition (Hadi, 1965). The average total milk production of 1172 liters and fat percentage of 8.24 percent as reported by Gujar *et al.* (2000).

It is well established that, increasing Ca and P contents in rations for dairy buffaloes had favorable effects on reproductive performance (Qureshi *et. Al.*, 2000). Mineral play an intermediate role in the promotion of action of hormones and enzymes at sub-cellular levels in an integrated fashion (Dhoble and Gupta, 1986). Upadhyay *et al.* (2006) opined that, in reproductive health turn is not

possible without proper mineral supplementation in their diet as most of the roughages, green, concentrates and even most of commercial feeds offer to Indian livestock are deficient in one or more of the mineral element. Saghar (2003) reported that, dietary minerals supplementation enhanced fertility rate. The calcium effect on reproduction appears to be primarily and indirect one because it affects the incidence of parturient paresis. Common sequel to parturient paresis includes dystocia, prolapse of uterus and retained placenta which tend to have negative effect on fertility. Due to phosphorus deficiency include a delayed onset of puberty and post-partum oestrus and milder deficiency have been reported to be associated with repeat breeding (Gaikwad *et al.*, 2007). Optimum level of Ca is required for maintenance of normal reproductive cycle and it has sensitizing action on reproductive organs through various hormones which further substantiate the findings of deficient Ca level in anestrus buffaloes (Kumar *et al.*, 1992). Furthermore Pisal (2012) earlier cited that, the supplementation of mineral mixture is beneficial for improving the production and reproduction performance of Gir crossbreds. Although information regarding effect of mineral supplementation on reproductive performance in dairy cattle and buffalo diets is available (Espinoza *et al.*, 1991; Wu *et al.*, 2000; Uchida *et al.*, 2001; Saghar, 2003; Begum *et al.*, 2010; Hadiya *et al.*, 2010; Ullah *et al.*, 2010) such information on Ca and P supplementation in buffaloes is limited.

The involution, post-partum oestrus and conception rate has been studied by various workers in Murrah buffalo (Bhalla *et al.*, 1966; Singh *et al.*, 1966; Bhalla *et al.*, 1967; Butchaiah *et al.*, 1975; Swain *et al.*, 1983; Peter *et al.*, 1987; Kaushish *et al.*, 1998), Surti buffalo (Rao *et al.*, 1973; Devraj, 1982; Pathak *et al.*, 1989; Shah *et al.*, 1999;

Khasatiya *et al.*, 2005), Nili rahi buffalo (Usmani *et al.*, 1985; Usmani, 1992; Saghar, 2003; Ullah *et al.*, 2010) and in Mehsani buffalo (Sutar *et al.*, 1992; Sutar *et al.*, 2004). However, no information is available on this aspect in Marathwadi buffaloes.

The present investigation was carried out to study the effect of mineral supplementation on involution, post-partum oestrus and conception rate in Marathwadi buffaloes.

MATERIALS AND METHODS

The fourteen advanced pregnant Marathwadi buffaloes, irrespective of their age and parity were selected from the local buffalo farms in and around Parbhani town in state of Maharashtra. Animals were maintained under free-range system and were let loose for grazing in the field. The animal had free access to drinking water. Selection of buffaloes was based on the records available from owner. Gynaeco-clinical examinations of all the pregnant buffaloes were carried out for the confirmation of advance pregnancy (after 10 months). A total of 14 animals were selected randomly. The selected buffaloes were calved within fifteen days. The selected buffaloes have good pedigree records. The 14 buffaloes were divided into two groups, those animals which shown serum Calcium and Phosphorus level below normal range i.e. (9.7-12.4 mg/dl and 5.6-6.5 mg/dl) were taken in Group I (n=7) i.e. Treatment group and those animals which shown serum Calcium and Phosphorus level within normal range were taken in Group 2 (n=7) and were kept as untreated control group. Group I were given orally mineral feed supplement daily 50 gms before and after 7 days of parturition. Involution of uterus was monitored at 48 hourly intervals through rectal examination

of the uterus in all the cases. Involution of uterus was considered complete, on the basis of criteria adopted by Buch *et al.* (1955) viz.

The ovaries of buffaloes were examined per rectally and observations were noted regularly for detection of an ovarian follicular development, corpus luteum development and regression if any. After the resumption of post-partum ovarian activity the first post-partum oestrus were observed on the basis of per rectal examination and signs and symptoms. The post-partum oestrus showing buffaloes were bred with fertile semen twice at twelve hours interval and the pregnancy was confirmed 60 days post breeding and conception rate was calculated.

Statistical analysis

The data analysed for mean and standard error (S.E.) and the significance was tested by using 't' test (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Involution of uterus

The both horns of uterus were easily

palpable in the abdominal cavity about a week's time after parturition. Thereafter a marked decrease in uterine size and gradual increase in uterine tone was observed. The feel of the involuting uterus was leathery in the beginning and then it changes to hard, flaccid and live towards the completion of the process. During gestation, the size of uterus increases for accommodating the foetus. The post-partum reproductive cycle starts with the reduction of size of uterus i.e. involution of uterus and the earlier it completed. The better it would be for economical performance of the animal. The average days required for complete involution of uterus in Marathwadi buffaloes were 38.14 ± 0.88 and 41.71 ± 1.78 days (Table 1) from the Group 1 and Group 2, respectively with non-significant statistical results however, irrespective of statistical numerical significance there was decline average days required for uterine involution in treatment group of buffaloes. In the present investigations rate of involution of the uterus was found to be rapid upto 14 days post-partum and it was found to return in the pelvic cavity, thereafter it was very slow. The size of uterus gradually decreased and from 21 days the rate of recending was considerably slow and after that it attains equal size of uterine

Table 1. Average days required for Involution of uterus.

Buffalo No.	Group 1	Group 2
1	39	41
2	41	40
3	37	39
4	35	50
5	41	36
6	36	40
7	38	46
Mean	38.14	41.71
SE	0.88	1.78
't' value	0.048 ^{NS}	

horn i.e. it regained its normal tone on day 33-38 post-partum.

The present findings of Group 1 are in close agreement with Roy and Luktuke (1962); Samadhia (1967); Dutta (1980); Peter *et al.* (1987); Samo *et al.* (1987) who reported the average days required process of involution were 39.3 ± 1.2 , 37.97 ± 1.66 , 39.91 ± 0.62 , 38.75 ± 1.25 and 38.4 days respectively, in buffaloes. The days required for the process of involution in the investigation was higher than that recorded by various workers as Bhalla *et al.* (1966), Ram *et al.* (1981), Choudhary *et al.* (1987), Choudhary *et al.* (1990), Ingawale (2006), Nasr (2007) and Sutar *et al.* (2004) in a buffaloes. Whereas, Presicce *et al.* (2005) found that, average time required for process of involution was 31.0 ± 1.0 and 33.0 ± 1.3 days from primiparous and pluriparous group of buffaloes. Also Khattab *et al.* (1995) mentioned that, higher days required for process of involution than the present investigation i.e. 41.3 ± 2.0 in Egyptian buffaloes. However El-fadaly (1980) observed that, average days required for involution was 38.3 and 36 days from sucking and milked buffaloes. Moreover Ahmed (1982) reported that, range of process of involution was 40-45 and 50-56 days from non-retaining and retaining cases of buffaloes.

In accordance with present result Ullah *et al.* (2010) who observed that, uterus of the parturating buffaloes involuted in non mineral supplemented group and mineral supplemented group at 30.6 ± 3.9 days and 29.2 ± 4.0 days post-partum, respectively.

Post-partum ovarian activity

Following parturition, there was an early resumption of sequential but transient FSH increase in 2-3 days duration in cows. The first increase results in the emergence of the first post-

partum follicular wave and decline in FSH results in selection of dominant follicle. The ovulatory fate of this dominant follicle depends on LH pulse frequency. In the post-partum dairy cows, growth of 6-8 mm follicles begins within 7 to 10 days of calving and from this group of follicles a single dominant follicle emerges and ovulates in 75-80 percent of cows between days 10-30 after calving. Cows ovulating after but not generally before, days 20 post-partum are more likely to have a short cycle (8-13 days duration) where the first dominant follicle ovulate (Roche and Boland, 1991).

In the present investigation the resumption of ovarian activities in the buffaloes were 4th week (25-34 days) and 5th week (31-43 days) from group-I and group-II, respectively. The good follicular activities were observed 6 (85.71 percent) ovaries and 5 (71.42 percent) ovaries from Group 1 and Group 2, respectively. Thereafter 3-5 days onwards in all these cases the ovulation take place and formation of first corpus luteum observed. Whereas, 1 (14.28 percent) and 2 (28.57 percent) buffaloes showed small follicular activity from group-I and group-II, respectively. The present finding of Group 1 are in close agreement with Usmani *et al.* (1985), Chaudhary *et al.* (1987), Samo *et al.* (1987), Noseir and Hussein (1988), Ingwale (2006) and Nasr (2007) who cited that, good follicular (Palpable) development in buffaloes on 21, 27.43 ± 12.4 , 22.4, 28.20 ± 8.75 , 28 and 30 days, respectively. However Bekana and kindhal (1994) observed that, resumption of cyclical ovarian activity within a month in seven animals by rectal palpation as well as on ultrasound. Whereas, more days required for initiation of follicular activity than the present investigation was reported by Baruselli (1991), Usmani (1992) and Shah (1999) in buffaloes. Parera (2011) reported that, dairy types and swamp types buffaloes resumes oestrus

cyclicity by 30-60 and 60-90 days after calving, respectively under optimal conditions. Jainudeen (1986) reported that, the interval from parturition to first ovulation is approximately 35 to 87 days for milked river buffaloes compared to 52 to 140 days for suckled swamp buffaloes.

In accordance with the present results Arya and Madan (2001) who observed that, 19.67 ± 3.33 and 19.17 ± 4.53 days for first ovarian activity in suckled and non-suckled Murrah buffaloes. Presicce (2005) noticed that, time for first post-partum ovulation was 25.5 ± 6.9 and 15.5 ± 1.3 days in primiparous and pluriparous buffaloes, respectively. Whereas, Usmani *et al.* (1985) reported that, formation of 1st CL on the day 12.8 ± 1.7 after calving. However, most of these studies were based on palpation of corpus luteum that formed following ovulation. It is accepted that CNS requires prior exposure to progesterone to elicit behavioral signs of estrus (Noakes *et al.*, 2001). The behavioural signs of oestrus did not accompany the first post-partum ovulation in majority of buffaloes. Furthermore Ullah *et al.* (2010) opined that, first post partum rise in progesterone and estradiol in non mineral

supplemented group and mineral supplemented group was observed on day (91.0 ± 29.7 , 54.8 ± 16.0) and (24.0 ± 4.43 , 30.6 ± 6.33) at ($P > 0.05$) level, respectively.

The present findings of early resumption of post-partum ovarian activity from the group-I is due to the mineral supplementation than the group-II i.e. non-supplemented group. In accordance with the present results Ullah *et al.* (2010) who concluded earlier that, mineral supplementation did not affect the post partum ovarian activity in buffaloes, in different seasons. Tallam *et al.* (2005) cited that, varying dietary phosphorus from 0.35 to 0.47 percent did not affect postpartum ovarian activity, reproductive performance, or milk production in dairy cows. Also Wu *et al.* (2000) opined that, reproductive performance of the cows was not related to dietary P content.

Post-partum oestrus

Average times required for first post-partum oestrus in buffaloes were 63.57 ± 2.22 and 69.86 ± 2.52 days (Table 2) in group-I and group-II respectively with non-significant statistical results however, irrespective of statistical numerical

Table 2. Average days required for onset of post-partum oestrus.

Buffalo No.	Group 1	Group 2
1	65	65
2	67	79
3	59	65
4	71	72
5	69	62
6	58	68
7	56	78
Mean	63.57	69.86
SE	2.22	2.52
't' value	0.043 ^{NS}	

significance there was decline average days required for post-partum oestrus in treatment group of buffaloes. The first post-partum oestrus exhibition is representing the completion of anatomical as well as physiological involution and initiation of post-partum ovarian cyclicity.

The present finding of Group-I are in close agreement with El-Fadaly (1980); Usmani *et al.* (1985); Samo *et al.* (1987); Sutar and Kavani (1992) who reported that, post-partum oestrus were 59.7 ± 25.4 , 56.4 ± 3.90 , 65.5 and 56.72 ± 3.58 days, respectively in buffaloes. However, Ahmad (1982) mentioned that, range of post-partum oestrus in buffaloes with retaining and non-retaining case were 86 to 89 and 63 to 65 days, respectively. Whereas Kaushish and Prasad (1998) observed that, post-partum oestrus in Murrah buffalo was 60 (10.6 percent) and 200 (47.1%) days, respectively. Also Khasatiya *et al.* (2005) found that, 69.00 ± 7.36 and 141.82 ± 21.32 days from fertile and infertile post-partum oestrus in Surti buffaloes. El-Wishy (2007) reported earlier that, post-partum oestrus occurred between 44 and 87 days and he also noted data from Egypt, India and Pakistan indicate that only 34-49 percent remained oestrus during the first 90 days after calving and 31-42 percent remained anoestrus for more than 150 days. Jainuddin *et al.* (1983) cited that, post-partum oestrus occurred between 75 and 90 days from River and Swamp buffalo, respectively. Pisal (2012) earlier reported that, postpartum estrus appeared significantly earlier in mineral supplemented group were 58 days as compared to control group in Gir crossbreds.

The duration of post-partum oestrus was recorded in the investigation was shorter than that recorded by various workers as Bhalla *et al.* (1967); Rao *et al.* (1973); Jainuddin *et al.* (1983); Swain and Bhatnagar (1983); Rebeiro *et al.* (1997); Shah (1999); El-Moghazy (2003). However Dutta

(1980) reported that, 49.25 ± 6.89 days in buffaloes for the post-partum oestrus. Also Ingwale (2006) noticed that, 45.08 ± 3.77 days from the control groups in buffaloes.

The variation between values referred by above mentioned research scientists and the present finding may be due to factors like differences in nutrition of dam, drying late gestation, post-partum period, season of calving, the post-partum husbandry practices including feeding, milking or suckling practice of hygiene, estrus detection aids.

Conception rate

It is important for optimal reproductive efficiency in buffaloes that they calve at 12-13 months interval. This is achieved only when the buffaloes conceive by 80 days after calving. After the all the buffaloes from both the groups showing post-partum oestrus were naturally served and considered for calculation of conception rate. The conception rate in this present study was 85.71% and 71.42% from Group 1 and Group 2, respectively.

The present results are higher in comparison with Parera *et al.* (1987) who reported that, 77.7% conception rate in a buffalo cows. Whereas Takkar *et al.* (1999); Ingwale (2006) observed that, lower conception rate i.e. 38% and 16.16% in a control group of buffaloes. Moreover Begum *et al.* (2012) reported earlier that, buffaloes fed 120% Ca and P conceived 100% but in buffaloes fed 100 and 80% Ca and P, conception rates were 75 and 50% respectively. Uchida *et al.* (2001) observed that, fewer services per conception and less days to conception as compared to non-supplemented control group of Holstein cows. The supplementation of minerals and enzymes did not influence service period significantly (147 ± 13.69 days) as opined by Hadiya *et al.*

(2010). Furthermore Espinoza *et al.* (1991) who cited that, During his three year experiment, in year first the medium phosphorus treatment group showed highest ($P<0.01$) pregnancy rates (88%) followed by High phosphorus (78%) which was higher ($P<0.01$) than Low phosphorus (60%). In years second and third, no differences ($P>0.05$) were observed among the three treatment groups.

CONCLUSION

It can be concluded from the present findings that the irrespective of statistical numerical significance there was decline average days required for uterine involution and post-partum oestrus in treatment group as compare to control group. The early resumption of ovarian activities and conception rate was also higher in treatment group. Due to pre-partum dietary mineral supplementation, which resulted in prevention of post-partum disorders in treatment group of buffaloes.

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