# IMPACT OF PROTEIN AND MINERAL SUPPLEMENTATION DURING TRANSITION PERIOD ON PUERPERAL EVENTS AND POSTPARTUM FERTILITY IN BUFFALOES

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**ABSTRACT**

Eighty-five advanced pregnant (~8 mo) pluriparous buffaloes at farmer's doorstep in tribal villages were selected and randomly divided into basal feeding (n=45, routine feeding by farmer) and basal + supplemental feeding (n=40, daily 1.5 kg concentrate mixture and 50 g chelated Area Specific Mineral Mixture) groups. The buffaloes received supplemental feeding for two months each pre- and post-partum. In addition, 15 buffalo of each group received injectable micro-mineral (5 ml, i.m.; each ml containing Se, Zn, Cu and Mn @ 5, 40, 15 and 10 mg, respectively) about two month before calving and on the day of calving. The micro-mineral injection appreciably reduced the incidence of retained placenta ($p>0.05$) as well as the placenta expulsion time ($p<0.05$) over non-injected buffalo. The period for involution of uterus was longer ($p>0.05$) in basal fed group compared to supplemented buffalo. Also, the interval to first postpartum estrus and service period were shorter with higher conception rate and lesser number of services per conception in supplemented buffalo than in buffalo reared on basal feeding ($p<0.05->0.05$). Injectable micro-mineral further improved all these traits in both the groups ($p<0.05->0.05$). Overall subfertility in terms of true anestrus, subestrus and repeat breeding was reduced in supplemented buffalo compared to basal fed buffalo ($p>0.05$). In brief, nutrient supplementation in terms of high protein concentrate and minerals (oral + injectable) during transition period prevented periparturient complications and improved the postpartum reproductive performance in buffalo under field conditions.

**Keywords:** Buffalo, Transition period, Nutritional supplementation, Postpartum fertility, Puerperal disorders

## INTRODUCTION

Poor nutrition is one of the main factors responsible for peripartiurient complications and long calving interval in dairy buffalo. The low energy level in early puerperium delays uterine involution, onset of ovarian activity and prolongs the service period (Khan *et al.,* 2015). The optimum nutritional management in terms of energy, protein, minerals, enzymes and use of oral/parentral anti-oxidants like vitamin E, selenium, iodine, and essential micro-nutrients like zinc, copper, manganese during transition period were highly beneficial in reducing periparturient disorders and enhancing uterine involution with improved postpartum fertility and productivity in buffalo (Mavi *et al.,* 2006; Khan *et al.,* 2015 and Modi *et al.,* 2016). Therefore, the present study was planned to evaluate the impact of nutrient management of transition period on puerperal events and postpartum reproductive performance in buffalo under field conditions.

## MATERIALS AND METHODS

In three tribal villages, 85 advanced pregnant (~8 mo) pluriparous buffalo of 2nd to 4th parity were selected and the study was initiated at two month prepartum. All the registered buffalo were maintained hygienically at farmers' doorstep and their basal feeding schedule included green fodder (10-12 kg), dry fodder (4-6 kg), concentrate (2-3 kg) and mineral mixture (30-40 g) as per farmers feeding practices in the region. All the buffalo were appropriately vaccinated, and were dewormed (Fenbendazole plus Ivermectin bolus 3.0 g orally) about 2 month before and on the day of calving.

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In the basal feeding group (n=45), the buffalo followed normal feeding schedule of a dairy farmer, whereas the supplemental feeding group buffalo, in addition to farmer's feeding schedule, received 1.5 kg compound concentrate mixture (22% CP) and 50 g area specific chelated mineral mixture daily for four months (2 mo prepartum and 2 mo postpartum). Further, 15 buffalo from each of basal feeding and basal+supplemental feeding group received injectable sustained release micro-mineral supplementation (5 ml, Stimvet(R), Wellcon Animal Health Pvt Ltd; each ml containing Se, Zn, Cu, Mn as 5, 40, 15 and 10 mg, respectively) around 2 month before and on the day of calving.

The animals were regularly monitored for puerperal events. The uterine involution was monitored by per-rectal palpation on days 15, 30-35 and 45 postpartum. The buffalo exhibiting estrus beyond day 55-60 postpartum were inseminated with good quality frozen semen by experienced inseminators. The reproductive status (pregnant, cyclic, anoestrus or repeat breeder) of all the buffaloes was ascertained by day 120 postpartum. The data generated on reproductive traits were analysed statistically using Chi-square test and 't' test to compare differences between groups.

## RESULTS AND DISCUSSION

The buffaloes monitored for the occurrence of periparturient reproductive and metabolic disorders exhibited dystocia and retention of palcenta only with no case of abortion, stillbirth, genital prolapse, puerperal metritis, agalactia or metabolic disorder (Table 1). Further, in both basal and basal+supplemented group, the parentral micro-mineral injection reduced the incidence of retained placenta ($p>0.05$) as

**Table 1: Impact of protein and mineral supplementation on puerperal events and postpartum fertility in buffaloes.**

| Parameter | Basal feeding | | Basal + Supplemental feeding | |
|---|---|---|---|---|
| | + Inj. Micromineral (n=15) | Control (n=30) | + Inj. Micromineral (n=15) | Control (n= 25) |
| **Puerperal events** | | | | |
| **Dystocia**, n (%) | 0 (0.0) | 2 (6.7) | 1 (6.7) | 1 (4.0) |
| **Retention of placenta**, n (%) | 1 (6.8) | 5 (16.7) | 0 (0.0) | 2 (8.0) |
| **Expulsion of placenta**, h | 2.79±0.42[a] | 5.76±0.78[b] | 2.05±0.16[c] | 3.93±0.52[d] |
| **Uterine involution**, days | 31.5±1.3 | 32.8±0.9 | 28.4±0.6 | 29.9±0.7 |
| **Postpartum fertility** | | | | |
| **First postpartum estrus**, days | 74.7±4.4 | 82.7±4.1 | 62.6±1.7[c] | 70.4±2.2[d] |
| **Service period**, day | 91.2±7.2[a] | 116.4±4.1[b] | 85.6±8.1 | 96.2±5.9 |
| **Services per conception**, n | 1.89 | 2.67 | 1.36 | 1.85 |
| **Pregnancy rate by d 120 post partum**, n (%) | 8 (53.3) | 10 (33.3) | 10 (66.7) | 12 (48.0) |
| **Overall subfertile**, n (%) | 7 (46.7) | 17 (66.7) | 5 (33.3) | 12 (52.0) |
| True anestrus, n (%) | 2 (13.3) | 6 (20.0) | 1 (6.7) | 3 (12.0) |
| Subestrus, n (%) | 3 (20.0) | 8 (26.3) | 3 (20.0) | 7 (28.0) |
| Repeat breeder, n (%) | 2 (13.3) | 3 (10.0) | 1 (6.7) | 2 (8.0) |

[a] *vs.* [b], [c] *vs.* [d] $P<.05$

well as the time required for placenta expulsion ($p<0.05$, Table 1), thus suggesting the beneficial role of nutrient supplementation. In earlier studies in buffalo, a reduction in the placenta expulsion time following peripartal administration of vitamin E and Se (Mavi *et al.,* 2006) or iodine (Zeedan *et al.,* 2010) is documented. The time taken for uterine involution was less ($p>0.05$) in basal+supplemental group compared to basal feeding group (Table 1). Similarly, peripartum bypass fat supplementation reduced days required for the uterine involution in dairy buffalo (Khan *et al.,* 2015). Also, the mean intervals observed for first postpartum estrus and service period were shorter ($p>0.05$), and conception rate was higher ($p>0.05$) in basal+supplemental feeding group compared to basal feeding group (Table 1). These parameters further improved ($p<0.05->0.05$) following injectable micro-mineral supplementation (Table 1). The faster uterine involution with earlier onset of postpartum ovarian activity and betetr conception rate clearly indicated a positive effect of peripartum protein and mineral (oral+injectable) supplementation on uterine health and ovarian activity in buffalo. The mineral and vitamin supplementation is known to have a positive impact on steroidogeneiss, follicular growth and symptoms of ovulatory estrus (Srivastava, 2008). In the farmers' opinion, the colostrum and first 90 days milk production was also improved in nutritionally managed buffalo, but authentic data could not be availed for want of maintaining such daily records for individual animals.

On day 120 postpartum, the overall incidence of subfertility in terms of true anestrus, subestrus and repeat breeding was higher in basal feeding group compared to basal+supplemental group (Table 1). Further, the micromineral injection, reduced the incidence of subfertility in basal as well as basal+supplemental group ($p>0.05$, Table 1). Various minerals (Cu, Co, Se, Mn, Zn, I) are known to influence the reproductive performance of ruminants (Hidiroglou, 1979). Thus, it can be concluded that peripartum protein supplementation along with oral and injectable minerals reduced puerperal disorders and improved postpartum fertility in buffaloes reared by dairy farmers of tribal areas.

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