The Haryana Veterinarian (March, 2024) **63(SI),** 110-113 ISSN 0033-4359 (P) **Short Communication**

PRODUCTIVE AND REPRODUCTIVE PERFORMANCE EVALUATION OF AREA SPECIFIC MINERALS SUPPLEMENTATION IN THE BUFFALOES

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SUMMARY

A research trial was planned to evaluate productive and reproductive performance of area specific minerals supplementation in the buffaloes during transition to early lactation period. Forty advanced pregnant buffaloes were identified and split into two groups *viz.*, Control (T0) and Treatment (T1). In treatment group animals were provided additional mineral mixture over the regular ration and in T0 animals were not supplemented with mineral mixture hence kept as control for comparison. Sample of milk were collected every fifteen days interval after parturition. Production parameters like total milk yield (120 days), peak yield, milk fat and SNF were compared between the groups. Beside these reproductive indices like first appearance of estrus after parturition, service period, conception rate and behavior expression of estrus were also studied. It was observed that total milk yield and peak yield were found non-significantly better in T1 than T0, although SNF% were significantly higher ($P < 0.05$) in T1 than T0. Reproductive parameters like service period and conception rate were found significantly better ($P < 0.05$) in the T1 than T0 animals along this; expression of estrus was more intense in mineral supplemented group in comparison to non-supplemented group. Results of the study indicated that area specific mineral supplementation in the buffaloes, significantly improved their productive and reproductive indices after parturition.

Keywords: Buffalo, Milk Production, Mineral Mixture, Reproduction

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Growth of animal husbandry sector is very crucial to improve the socio-economic setups of developing countries (Herrero *et al.*, 2013). Out of all livestock products; influx of milk is very critical to regulate income from livestock sector in India where cattle and buffalo both contribute in the total milk pool nearly equally. However, production of milk in Punjab primarily comes from buffaloes. Production of milk from the buffaloes depends on the supply of adequate nutrient which depend on the requirement of the animals which again depend on the production potential of the animals. This adequate balanced nutrition regulates the various physiological function of the body which helps to synthesis quality milk and maintains optimum reproduction status of the buffaloes. But, in India due to traditional nature of feeding which depend on the locally low grade feed stuffs, it become very difficult to fulfill the animal's nutritional requirement in the daily ration (Garg *et al.*, 2013). Due to compromised soil health, green and dry fodder that constitute a major portion of animal's diet are very poor in essential minerals eventually lead the poor production and impaired reproduction in the buffaloes. In the current scenario, supplementation of the minerals is indispensible for animals which revamp the animal condition by improving in day to day growth, diseases resistance, feed conversion efficiency, production of milk and reproductive indices. Appropriate supplementation of area specific minerals also shorten inter-calving interval and curtail the metabolic disease incidence (Mohanta and Garg, 2014). By assessing the mineral profile of feeds and fodder of the livestock in the particular agro climatic zone, most deficit mineral can be identify and its deficiency can be overcome through the area specific mineral supplementation (Selvaraju *et al.*, 2009). This strategy has been proved to improve the cross bred cattle reproductive efficiency and also improve its overall health status under field conditions (Crowe *et al.*, 2018). Thus, this study was, design in this direction to evaluate the area specific minerals supplementation effects on the productive and reproductive efficiency of buffaloes at farmer field conditions during transition period to mid lactation period.

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Ethics Statement

The methodologies used in this study complied with the Punjab Agricultural University Code for the Responsible Conduct of Research. All experimental procedures were conducted according to the proposed guidelines by Ethical Committee of the University.

Description of experimental animals and husbandry practices

Present field trial was planned in the Jalandhar district of Punjab, where five villages were selected to identify 40 upgraded Murrah buffaloes in their advance pregnancy at 20 farmers site. All animals at their respective location were divided in to two groups, having 20 animals in each group collectively. First group kept as treatment

group (T1), was fed additional 40 g and 80 g of mineral mixture during two months of dry period and postpartum till mid lactation yield, respectively in their daily ration. Central zone mineral mixture procured from department of animal nutrition, GADVASU, Ludhiana having 22% Calcium, 12% Phosphorus, 4% Magnesium, 0.04% Iodine, 0.14% Copper, 0.009% Cobalt, 1.0% Zinc, 0.15% Manganese, 2.4% Silica and 5% Moisture. In other group T0 (Farmer practice) treated as control where farmer followed their own feed formula without any minerals supplementation. Rest of the feeding practices like roughages and concentrate feeding were kept similar in both the groups. Other managemental practices were kept similar in both the groups during the entire experiment period. Sample of milk were collected fortnightly and analyze through ultra-scan milch analyzer (Kurien from Hindustan Thermostatic Sr. No. 28251) for various milk quality parameters like milk fat (%), milk SNF (%) and total milk solid (%). Beside these milk production parameters like daily milk yield (lt), time taken to reach peak yield (Days), peak production (lt) and total milk production of 120 days (lit.) were noted during experiment period. To identify various reproductive indices, animals were observed on daily basis for recording their behavioral changes during the estrous phase. To analyze the reproductive efficiency various related parameters such as, time lapse to reach in first estrous (days), service period, service per conception and conception rate (%) was recorded from all the animals in the both groups. The data recorded on various parameters were pooled and analyzed for any significant difference by Analysis of Variance by using SPSS (2007) version 16.

RESULTS AND DISCUSSION

Reproductive Indices: Results of reproductive parameters has summarized in Table 1. Mineral mixture fed buffaloes (69.6 ± 3.48 days) observed for first heat sign in 15.1 days earlier than the control group animals (84.7 ± 3.41 days) which was significantly ($p < 0.05$) better. Mudgal *et. al.* (2014) also reported the similar finding in dairy animals supplemented with Cu mineral. These finding of early onset of first postpartum estrus in treatment than control animals are similar to the previous work of Koley and Biswas, (2004), Rabiee *et al.* (2010) and Agrawalla et al. (2017), they also find that supplementation of minerals reduces the time of onset of first postpartum estrus thereby decreases days to first service post partum and hence improves conception rate in bovine species. Specific mineral supplemented group (1.64 ± 0.71) also had significantly ($p < 0.05$) less number of service/AI per conception than the non supplemented group (2.02 ± 0.84). Beside it, service period was observed significantly ($p < 0.05$) lower in mineral fed group (84.6 days) than the non supplemented group (102.9 days). Postpartum feeding of minerals to buffaloes was competent to lessen service period by 18.3 days, which was in accordance to the observations of Bisla *et. al.* (2006), Puvarajan (2013) and Sahoo *et. al.* (2017) on the mineral supplemented dairy animals. Conception rate of mineral mixture fed animals were observed 44.4% higher than the non supplemented experimental animals. Comparable result on conception rate in mineral supplemented heifers was also observed by Behera *et. al.* (2012). Poor fertility and low conception are observed mainly due to phosphorus and other minerals deficiency in dairy animals (Kantwa *et. al.*, 2021). Whereas, moderate deficiency lead to repeat breeding status in the buffaloes. Proper supplementation of phosphorus in required quantity can overcome the phosphorus deficiency symptoms in the animals Kumar (2003). Finding of current study were accordance to observation of Mavi *et al.* (2006) and Kantwa *et al.* (2021) who observe that supplementation of minerals in buffaloes during transition phase leads to early induction of postpartum ovarian functioning, early display of first postpartum estrus, increase conception rate and lower the service/AI per conception.

Intensity of Estrus Expression: To observed the changes in behavioral sign of estrus, *viz.* vaginal discharge, bellowing, reddening of vulva, tumefaction of vulva, drop in feed consumption, drop in milk production and restlessness were noted and their intensity was calculated in terms of percent of animals (Fig. 1). It reveals that expression of estrus was more intense in mineral supplemented group in comparison to non supplemented group. The level of estrus symptoms was intense to moderate in treatment group while in control group expression of estrus fall between weak to moderate level. In treatment group about 49% of animal has showed their estrus expression in intense level while in control group only 29% animals estrus expression was intense in nature. Panda *et al.* (2006) and El-Wishy (2007) also found similar result in their experiment of mineral mixture feeding on the buffaloes.

Milk Production Parameters: Data was recorded for milk production parameters and its composition and presented in Table 2. It has observed that daily average milk yield was non-significant higher in the T1 comparison to T0. Alongside of this, treated animals have produced numerically higher total milk yield than the control group. Peak milk production and total 120 days milk yield was significantly higher in T1 over T0 by 8.3% and 6.76%, respectively. Noeek *et al.* (2006) has also observed higher milk yield in mineral supplemented dairy animals. Singh *et al.* (2016) and Madke *et al.* (2018) also

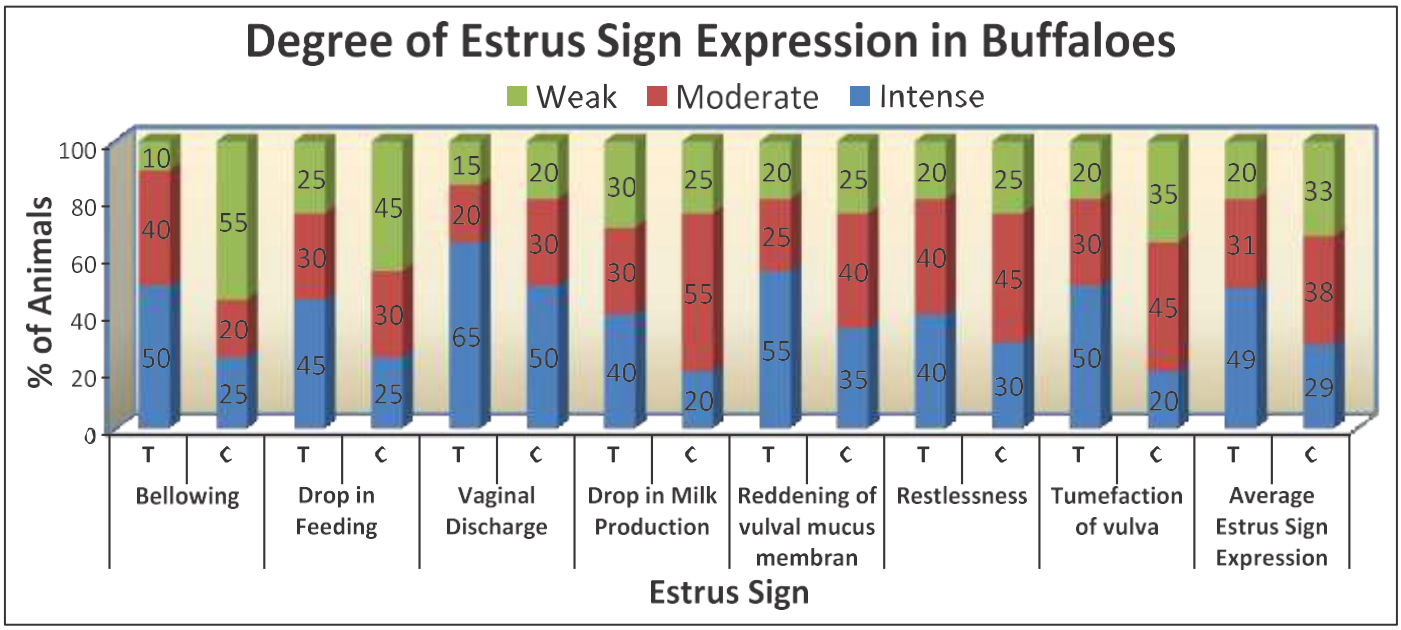

Fig. 1. Comparison between mineral mixture supplemented group (T1) and control group (T0) for intensity of estrus sign.

Table 1. Effect of area specific mineral mixture supplementation on reproductive performance in Murrah buffaloes (Mean ± SE)

Reproductive Indices	Treatment (T1)	Control (T0)	% Changes	P value
Appearance of First Post-Partum estrous (Days)	69.6 ± 3.48[b]	84.7 ± 3.41[a]	-17.83	0.0236
Number of Insemination/conception	1.64 ± 0.71[b]	2.02 ± 0.84[a]	-22.64	0.0387
Service Period (Days)	84.6 ± 0.94[b]	102.9 ± 0.81[a]	-17.78	0.0268
Conception Rate (%)	80.00[a]	60.00[b]	+37.50	0.0245

Mean values bearing different superscripts in a columns differ significantly (P < 0.05) (n = 20)

Table 2. Effect of mineral mixture supplementation on milk production performance in buffaloes (Mean ± SE)

Milk Production parameters	Treatment (T1)	Control (T0)	% Changes	P value
Peak Milk Yield (lit.)	10.4 ± 1.65	9.6 ± 1.06	8.33	0.342
Time lap to reach peak yield (days)	53.7 ± 1.80[a]	48.2 ± 1.94[b]	11.41	0.028
Total Milk Yield for 120 days (lit.)	948 ± 2.46	888 ± 2.71	6.76	0.421
Daily Milk Yield (lit.)	7.9 ± 0.94	7.4 ± 0.86	6.76	0.183
Milk Fat %	7.22 ± 2.86	7.18 ± 3.75	0.56	0.223
Milk SNF %	9.74 ± 0.76[a]	8.92 ± 0.86[b]	9.19	0.042
Total Milk Solid	16.96 ± 2.0	16.1 ± 1.67	5.34	0.493

Mean values bearing different superscripts in a columns differ significantly (P < 0.05) (N = 20)

reported similar finding of increase milk production in mineral mixture fed dairy animals. These findings are also similar to those of Hackbart *et al.* (2010), Tiwari *et al.* (2013) and Islam *et al.* (2023) where they observed higher milk production performance in cattle during mid-lactation stage. Time lap to achieve peak production was significantly ($p<0.05$) better in T1 than the T0. The animals that consumed area specific mineral mixture took longer time to reach their peak milk production, but these buffaloes exhibited greater persistence in their peak milk yield. These finding indicate that supplementation of mineral mixture is very efficient to improve milk production in buffaloes due impactful action on the milk synthesis cells in mammary gland (Rohilla *et. al.*, 2007). Milk fat percentage was observed non-significantly higher in treatment group than the control group. Percent SNF was found significantly ($p<0.05$) higher in T1 than the T0. Although, total solid of milk was non-significantly better in treatment group (16.96±2.0) than control group (16.1±1.67). These findings were comparable with observation of Verma *et. al.* (2009).

CONCLUSION

Supplementation of area specific mineral mixture positively impacted reproductive efficiency of the buffaloes

as it leads timely onset of first postpartum estrus, improve conception rate and strengthen the milk production indices like milk yield and SNF without any significant effects on milk fat and total solid. The addition of specific deficient minerals through area specific mineral mixture is recommended to feed the buffaloes for maintains the optimum production and reproduction status in their productive life.

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