



Research Article

EFFECT OF MINERAL SUPPLEMENTATION ON PRODUCTION AND REPRODUCTION PERFORMANCE OF BUFFALOES UNDER FARMER MANAGEMENT PRACTICES

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Abstract: An experiment was conducted to evaluate the impact of mineral mixture supplementation on overall performance and economics of lactating buffaloes. Trial was conducted on 80 buffaloes of nearly at the same lactation stage, milk yield and parity selected from six villages of Barnala district of Punjab. Buffaloes were divided in two group; 40 buffaloes were kept in each group viz. control (T1) and treatment group (T2). Two buffaloes of each farmer were selected to maintain similarity in feeding and management practice. Treatment group was supplemented 50gm mineral mixture per day/ buffalo for whole trial period additional to control group. The data were recorded by the farmers daily in the morning and evening and by the researcher at weekly interval. Analysis of data revealed that supplementation of mineral mixture increased the milk yield by 1.36 litre/ day (13.77%) in treated group and significantly ($P < 0.05$) reduce post partum oestrus period, service period, number of A.I per conception leading to increased conception rate in the buffalo. The B:C ratio of mineral mixture supplementation was observed 1: 16 under farmer management practices. It was suggested to supplement the mineral mixture to the lactating buffaloes for higher production and reproductive efficiency for getting higher return and sustainable profit from dairy farming.

Keywords: Buffalo, Mineral mixture, Milk yield, Supplementation

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Introduction

Punjab is one of the smallest states of India, covering an area of 50362 km², representing 1.53% of country's total geographical area and is popularly called as India's bread-basket state. The Punjab State contributes 7.3% of milk to the National grid, from about 3% of the total milch population of the country [1]. Balance feeding along with mineral supplementation to the dairy animals is essential to get higher and sustainable income from dairy farming. Mineral supplementation to the lactating dairy animals increased the milk yield reported by various researchers in their respective study. Wu, *et al.* 2001 [2], Gimbi, *et al.* 2004 [3], Saxena, *et al.* 2008 [4], Sharma, *et al.* 2009 [5] and Tiwari, *et al.* 2012 [6]. Minerals are the essential nutrients bearing a significant role in the animal reproduction, because their excess or deficiency produces detrimental effect on the performance of livestock (Akhtar *et al.* 2009 [7]). On mineral supplementation, improvement in reproductive status was reported by many workers [8,9]. However, majority of the feed and fodders given to livestock are deficit in major nutrients all over India (Sharma *et al.* 2008 [10]). Deficiency of a single or multiple mineral or their imbalances lead to delayed puberty, delayed ovulation, lower conception rate, high embryonic/foetal losses and prolonged postpartum anestrus [11]. The deficiency of certain minerals like Calcium, Phosphorus, Copper and Zinc in dairy cattle has been reported under field conditions [12]. Immunological disorders affecting growth, production and reproductive health of animals as per Kumar 2015 [13]. The supplementation of the mineral mixture is a simple and economical method to increase the productivity of the animals, where minerals need is not fulfilled through feeds and fodders. Present study was conducted to evaluate the effect of mineral mixture supplementation on milk yield, post-partum estrus, service period, conception rate, number of A.I required per conception and economics of feeding mineral mixture under field conditions.

Material and Methods

The present study was conducted under front line demonstrations laid out during 2015-16 in six villages of Barnala district of Punjab to evaluate the impact of mineral mixture supplementation on production and reproduction performance of buffaloes under farmer management practices. A total of 80 lactating buffaloes of nearly at the same lactation stage, milk yield and parity were selected of 40 farmers. To maintain similarity in feeding and management practices, two buffaloes of each farmer were selected and one buffalo was kept as control and another was supplemented with mineral mixture and considered as treatment group. Thus, a total 40 buffaloes kept in treatment group and 40 kept under control group. All the animals were managed under farmers management practices. The daily milk yield was recorded in morning and evening by the farmers in a diary provided by the institute and at weekly interval by the researcher for fair degree of precision. Reproductive data viz. post-partum estrus, service period and number of A.I per conception was also recorded. The trial was conducted for a period of 120 days. The feeding of buffaloes in control group (T1) consisted 5-6 kg dry fodder (wheat straw), 30-40 kg maize fodder (Zia Maize) as green and 5-6 kg concentrate per day per buffalo. The separate feeding to the experimental buffaloes was followed. The drinking water was offered ad lib. The composition of the concentrate for both animal (groups) was similar. The concentrate was offered two times a day just before milking in morning and evening. In treatment group in addition to above 50 gm. Mineral Mixture Type-2 per buffalo was supplemented during whole experimental period. The type -2 mineral mixture is being prepared and supplied by Department of Animal nutrition, Guru Angad Dev Veterinary and Animal Science University, Ludhiana consisting of Moisture 5%, Calcium 20%, Phosphorous 12%, Magnesium 5%, Sulphur 1.8-3.0%, Iron 0.40%, Iodine 0.10%, Copper 0.80%, Zinc 0.012%, Manganese 0.026,

Table-1 Effect of mineral mixture on milk yield, service period and number of A.I per conception

SN	Para meters	Control group(T-1)	Treated Group(T-2)	t value	Significant/ non-significant level
1	Initial milk yield(L/day)	9.72±1.30 ^a	9.88±1.71 ^a	0.80	Non significant
2	Average Milk yield (L/day)	9.88±1.71 ^a	11.24±1.38 ^b	6.62	P<0.05
3	Postpartum estrus(days)	118.10±8.56 ^a	94.02±6.42 ^b	24.27	P<0.05
4	Service period (days)	146.74±9.26 ^a	110.74±7.90 ^b	31.68	P<0.05
5	Number of A.I per conception	2.12±0.65 ^a	1.64±0.61 ^b	5.82	P<0.05

Superscripts indicate significant difference within the rows

Table-2 Economics of supplementing mineral mixture in lactating buffaloes

SN	Para meters	Control group(T1)	Treated Group(T2)
1	Average milk yield(L/day)	9.88±1.71 ^a	11.24±1.38 ^b
2	Feeding cost/day/animal (₹)	219.0	222.25
3	Average feed cost per litre of milk production	22.17	19.77
4	Gross return from sale of Milk (₹ 39/lit.)	385.32	438.36
5	Net profit per day (₹)	166.32	216.11
6	Net profit per litre of milk (₹)	16.83	19.23
7	B:C	1.76	1.97
8	Additional milk yield by supplementing mineral mixture (L)	-	1.36
9	Milk yield increase over control (%)	-	13.77
10	Value of additional milk (₹)	-	53.04
11	Cost of mineral mixture supplementation (₹ /day)	-	3.25
12	B:C ratio for supplementing Mineral mixture	-	16.32

Silica 3.0% Fluorine 0.05%, Lead (mg/gm) 20.0 and Arsenic(mg/gm) 7.0. A training programme was conducted for the farmers before starting the experiment to educate them for correct method of data recording on different parameters. The data were tabulated and analyzed as per [14] and t- test was applied to test the significance level between both the groups.

Results and Discussion

The average initial milk yield in control and treatment group was almost similar (9.72 vs 9.88 lit./day) and during the trial period it was observed 9.88±1.71 and 11.56±1.41 lit./day in control and treated group, respectively [Table-1]. It indicates that the average milk yield of buffalo in treated group was significantly higher (P<0.05) as compared to control group. This finding was in line with Akila 2013[15] who reported that milk yield of cattle on an average increased remarkably to 1.46 ± 0.14 per day in cow. Wu *et al.* 2001[2], Gimbi *et al.* 2004[3], Saxena *et al.* 2008[4] and Sharma *et al.* 2009[5], Tiwari *et al.* 2012[6] also reported increase in milk yield due to supplementation of area specific minerals. Gupta and Sawal 2013 [16] observed significantly higher (P<0.01) milk production in animals supplemented with mineral mixture. Tiwari *et al.* 2013[17] reported feeding of area specific mineral mixture increased milk yield 25% in field trials. Senthilkumar *et al.* 2015[18] reported that supplementation of TANUVAS - mineral mixture in dairy cattle, resulted in increase in milk yield by one litre. Singh *et al.* 2016[19] reported that area specific mineral mixture supplementation increases milk yield. The average post-partum estrous period was lower (94 days) in treatment group as compare to their counterpart, control group (118 days), which shows significant difference (P<0.05) [Table-1] These findings are accordance of Mohapatra *et al.* 2012[20] also observed lower post-partum estrous in mineral mixture supplemented group than control. The average service period was observed 110.74±7.90 days in treated group and 146.74±9.26 days in control group. It was found significantly (P<0.05) lower in buffaloes supplemented with mineral mixture as compare to non-supplemented buffaloes. One-month higher service period in control group reduces the return of farmer from buffalo farming. The number of A.I required per conception was also significantly (P<0.05) lower in treated group (1.64) as compared to control group (2.12). Mohapatra, *et al.* 2012[20] reported that service per conception were significantly lower in mineral supplemented group than control. The improvement in reproductive performance of buffaloes due to mineral supplementation as compared to the performance of unsupplemented group was very clear. Economic analysis of the data showed that supplementation of mineral mixture enhances the milk yield by 13.77% per day in treatment group [Table-2]. The feeding cost of per litre of milk was lower (₹ 19.77) in treatment group as compared to control group (₹ 22.17). Gross return from sale of milk (₹ 438.36 vs 385.32) and net profit per litre of milk was found higher in treatment group (₹ 19.23) than control group (₹ 16.83). The benefit-cost ratio was

also found higher in treatment group as compared to control (₹ 1.97 VS 1.76). It was observed that farmers getting ₹ 53.0 additional per day by supplementing mineral mixture and benefit-cost ratio of feeding mineral mixture was 1: 16. 32. It can be concluded from the present study that supplementation of mineral mixture to the lactating buffaloes under field conditions not only increases the milk yield, but also reduce cost of per litre of milk production, post-partum estrus period, service period and number of A.I per conception. Hence, it is needed to educate the farmers to supplement the mineral mixture to their animals to get more profit from buffalo farming.

Application of research: Research is applicable for dairy farmers of the state for economically milk production

Research Category: Front line demonstration

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