EFFECT OF FEED SUPPLEMENTATION THROUGH MULTI NUTRIENT FEED BLOCK (MNFB) ON MILK PRODUCTION, COMPOSITION AND REPRODUCTIVE BEHAVIOUR OF BUFFALOES (*Bubalus bubalis*) – A FIELD STUDY IN ARID RAJASTHAN

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ABSTRACT

The buffalo rearing is adopting faster rate in arid region of Rajasthan due to its multifaceted utility for both milk and meat. Despite of better management practice are adopted for buffaloes, they also depend upon grazing and poor quality of fodder to meet out their total dry matter intake. The concept of balanced feed with respect to mineral and vitamins are not aware by farmer's community. Thus, the alternative low cost balanced feed was adopted in buffaloes under field condition to augment the milk production with optimum reproductive efficiency. MNFB was developed at feed technology unit of CAZRI, as solidified block of wheat bran, guar meal, dolomite, -minerals and vitamins mixture powder, salt, molasses and urea solution. The study evaluated feeding effect of multi-nutrient feed block on milk production and reproduction performances of lactating buffaloes. The Buffaloes under treatment were divided randomly into two groups and assigned to two dietary treatments under village condition. After calving, all the buffaloes in treatment group were dewormed with albendazole 3 gms and feeding of MNFB 2 blocks (2 kgs each)/week for 3 months during March to May. The control group received diet containing bajara (Pearl millet) kuti, dry grasses, crushed cotton and til (sesame) cake. Milk production, peak milk yield were increased highly significant. Fat percentage was significantly increased. All Observations were monitored as per format. In reproductive performances were like sign of oestrus, conception and post partum reproductive complication 90%, 86.6% and 0.06% in treatment group and 70%, 60% and 30% in Control group respectively. It was concluded that MNFB feeding improved milk yield, milk fat, general health status and reproductive performance of buffalos, as it is a good source of protein, energy, and minerals. It is recommended that MNFB should be used as a supplementation in lactating buffaloes when they area fed with low quality fodder in arid and semi arid region.

Keywords: *Bubalus bubalis*, buffaloes, milk, MNFB, reproduction

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INTRODUCTION

The trend of buffalo rearing is increasing in both arid and semi-arid regions of Rajasthan despite constraints of poor availability of green fodder and harsh environmental conditions. Dairy animals frequently encounter nutritional deficiencies due to high cost of conventional concentrate feeds (cereal grain, pulses, oil cake etc.) prohibits their wide- scale use, especially by the marginal farmers, consequently leads to low milk production and reproductive disorders. Deficiency of minerals and vitamins and imbalances cause metabolic disturbances and deficiency diseases (Kumar *et al*., 2011). Bakshi and Wadhwa (2011) reported that the poor quality crop residues constitute the bulk of dry matter consumed by the ruminants. Such poor-quality roughages can be enriched with use of urea and other NPN resources like nutrient utilization (Bakshi *et al*., 1986; Bakshi and Wadhwa, 2011) and milk production (Lamba *et al*., 2002) has improved by use of UMMB and, hence, helped in saving of oilseed cake/concentrate for vulnerable species. According to Delgado *et al*. (1999) continuous increase in demand for animal products, particularly in developing countries, has thrown challenges to improve animal productivity through appropriate technologies. For sustainable animal production in developing countries feeding of locally available feed resources would be the only way (Devendra and Leng, 2011). However, poor utilization of feeds available locally limits the animal production in tropics. Therefore, strategic supplementation to locally available fibrous feed resources is an important aspect to improve animal productivity (Sharma *et al*., 2004). It was, therefore, considered important to look for alternate supplements to improve the nutrition of buffaloes during scarcity period. The present investigation was undertaken to assess effect of Multi-Nutrient Feed Block (MNFB) feeding (made out of low cost locally available materials through supplementation) on milk production and reproductive performance of buffaloes.

MATERIALS AND METHODS

The present study was conducted under field conditions for assessment of MNFB feeding to buffaloes. The study was conducted on newly calved lactating buffaloes from Pukawas, Lunawas, Bakaliya and Paladi Ranawata adopted villages from Luni, Pipar city, Bhopalgarh tehsil of Jodhpur district during the year 2016 to 2019. The majority of selected buffaloes showed poor health like low body score condition with rough and dried skin coat and reproduction problem like anoestrus. Buffaloes were in 3 to 6 lactation and having age between 8 to 12 years. The study conducted on lactating buffaloes, were divided into two groups on the basis of farmer practice (Control n=10) and recommended practice (Treatment n=30) groups. After calving, all the animals in Treatment group were dewormed with albendazole 3 gms /animal and supplemented with MNFB (2 kg/week/buffalo) along with regular diet for a period of 3 months. These buffaloes were maintained under semi-intensive management systems where they were allowed to graze on harvested fields and common grazing lands near the farmer's house during day time and also stall feed with dry fodder including straws of pearl millet, wheat and sorghum crops 5 to 6 kg/head/day. Lactating buffaloes were also supplemented with concentrate feed involving locally available feed ingredients like crushed wheat (Ghat), cotton seed, barley, pearl millet, and mustard and sesame cake. The daily milk

yield of buffaloes for both morning and evening times was recorded in milk record index card by the farmers. Milk samples were analyzed Co-operative and private dairy at the milk collection centre for total solids, total protein and fat content etc. The average milk production data (twice daily and monthly) and reproduction data (occurrence of oestrus and conceptions, post partum complication etc.) of each animal under treatment were recorded in both groups through a well-structured pretested Performa. The MNFB was prepared as per standard method at Feed technology Units of Indian Council of Agricultural Research-Central Arid Zone Research Institute, Jodhpur, as solidified block of wheat bran, guar meal, dolomite, vitamin-minerals mixture powder and salt mixed with molasses and urea solution (Table 1). The tabular analysis and percentage were used to analyse the data and compared between groups. Statistical analysis of data was done as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSIONS

The buffalo rearing trend is increasing in arid and semi-arid Rajasthan with Murrah breed or graded Murrah in comparison of cow due to very low milk yield of non descriptive cows and social taboo and adverse government policies in disposal of unproductive cattle. The buffaloes are cared better for feeding and other management practices than the cows by the farmers. But the concept of balanced feeding not followed much by farming community due to lack of awareness and knowledge. Various extension activities like farmers meeting, exposure visit, on/off campus training and field day were organised to create awareness about significance of low cost balanced ration. With the constant efforts, farmer understood the concept of balanced feeding in buffalo and its role in maintaining the milk yield even in scarcity period and overcome the infertility problems. Thus, the farmers were ready to adopt inclusion of MNFB feeding in the daily feeding practice. The recording of daily milk yield of buffalo was started before 15 days of experimentation and depicted in Table 2. After initial reading of daily milk yield in experimental animals, the MNFB were offered to buffaloes in the manger during stall fed. Animals accepted MNBF readily and it was observed that in initial period most of the animals tended to bite the block due to good taste & aroma of molasses. However, as the time pass animals liked to lick the block. The average daily consumption of MNFB by each animal was about to 200 to 300 g but more consumption of UMMB (400 to 500 g) was recorded in adult cows and buffaloes (Makkar and Saipul, 1996). The intake of MNFB also depended upon the basic feeding condition of animals (Kakkar *et al*., 1997) observed that calves kept on lower amounts of concentrate consumed more UMMB (695 vs 559 g/day).

Milk production parameters

The effect of feeding MNFB on milk production of buffaloes under village condition is shown in Table 2. The peak milk yield, per day milk yield (Mean±SE) in control and treatment group was 7.54±0.47; 10.87±0.78 and 7.64±0.20; 10.07±0.21 litres, respectively**.** Significantly higher difference between control and treatment group was observed. No significant difference in SNF and total solid was observed between these groups but significant difference in fat percentage during the trial period was observed. According to Brar and Nanda (2008) the increase in milk production can be attributed to the higher supply of crude protein, energy and minerals to the animals and increased

digestibility of the ration. The highest milk yield was found with feeding of MNFB, so it is clear that MNFB feeding has significant effect on peak milk yield, per day milk production and fat percentage. Wanapat *et al. (*1999) reported the significance effect milk yield of cow. But the change in milk composition suggest that it depend on many factor most important of which is the composition of diets. Diet containing more protein and fat will increase protein and fat containment of milk (Khan *et al* 1990). However, conflicting results are also reported by some authors that feeding has no significant effect on milk composition (Ahmed *et al*., 1982; Teller *et al*., 1980). Tiwari *et al.* (1990); Toppo *et al.* (1997) also observed similar results for CP digestibility in UMMB supplemented groups. It has been found that MNFB supplementation increases digestibility, feed intake, live weight gains and the net return. Further, macro and micro element provided by MNFB can easily correct multi-nutritional deficiencies of ruminants. The cost-benefit analysis revealed higher economic return from milk production in buffaloes fed complete feed mixture.

Reproductive performance

For profitable dairy farming an efficient reproductive process is a prerequisite. In Buffaloes, delayed onset of ovarian activity after parturition and deep anestrous high incidence, especially during dry seasons lead to prolonged inter-calving intervals. Buffalo is a seasonal breeder and hence for economic buffalo farming timely conception after calving is one of the most important factor. The observations of study on reproductive performance are depicted in Table 3.

The low number of buffaloes in oestrus and less percentage of conception in control group may be due to mineral deficiency, heat stress, as well as non-availability of sufficient quality fodder. The improved reproductive performance in treatment group of lactating buffaloes clearly reveals beneficial effect of MNFB supplementation. Similarly, 83.3% buffaloes and 66.7% cows showed oestrus symptoms when supplemented with UMMB in comparison to control (Ramesh *et al*., 2009). Similar findings have been reported earlier by Samanta *et al.* (2005), Singh and Pachauri (2011), Singh *et al.* (2010), Behera *et al.* (2012). When buffalo's cows were supplemented with urea molasses multi-nutrient block, 40% buffaloes showed behavioral estrus as compared to 10% in the control group in India (Salman, 2007). Choudhary *et al.* (2018) observed that the feeding of UMMB improve the milk production, dry matter intake, general health condition and reproductive performance. MNFB increases the conception rate; oestrus symptom might be due to the positive changes in the hormones like oestrogen, progesterone and minerals like calcium, phosphorus, copper, iodine, Zinc, selenium and iron etc. to the body which leads to optimum function of the reproductive system of buffaloes. In rural areas, quality nutrition is needed for improved reproductive performance, which is a major constraint because of limited availability of concentrates and green fodder.

CONCLUSION

It can be concluded on the basis of results of this study that licking of MNFB to lactating buffaloes increase milk production and improves reproductive performance. During the summer season supplementation by MNFB was most effective as it ameliorated heat stress thus resulting in improved milk production and

Table 1. Composition and chemical constitution of multi nutrient feed block.

S. No.	Ingredent (%)	Proximate component (%)
1	Molasses (44.5)	Dry matter (97.3)
2	Urea (4.3)	Organic matter (78.3)
3	Common salt (4.3)	Crude protein (22.9)
4	Dolomite (4.3)	Ether extract (4.1)
5	Minerals and vitamins mixture (4.3)	Minerals (21.7)
6	Wheat bran (32.1)	Total carbohydrates (51.3)
7	Guar gum dust (1.0)	Gross energy-kal (381)
8	Guar meal (5.1)	

Table 2. Effect of feeding MNFB on milk production in buffaloes (Mean ± SE).

Milk production parameters	Treatment	Control	T test
Peak milk yield (litre/day)	10.87±0.78	7.54±0.47	**
Average daily milk yield (litre/day)	10.07±0.21	7.64±0.20	**
Average milk fat (%)	6.08±0.10	5.79±0.17	*
Average milk SNF (%)	9.50±0.12	9.35±0.11	NS
Total solid in milk (%)	15.58±0.18	15.29±0.18	NS

* = significant at 5% level; ** = significant at 5% level and 1% level.

Table 3. Effect of multi nutrient feed block feeding on reproductive parameters in buffaloes (Mean ± SE).

Reproductive parameters		Treatment (30)		Control (10)	
First post partum oestrous	45-90 days	14 (46.6%)	90 %	2 (20%)	70%
	90-120 days	9 (30%)		3 (30%)	
	More than 120 days	4 (13.3%)		2 (20%)	
Symptom of oestrus		Very good		Poor	
Conceived and conception rate (%)		26 (86.6%)		6 (60%)	
Post partum complication		2 (0.06%)		3 (30%)	

better reproductive performance. Hence, it is recommended that for nutrition supplementation MNFB should be regularly given to the buffaloes by the buffalo owners, especially during summer season, to get better economic returns through buffalo rearing in arid and semiarid regions.

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REFERENCES

Ahmed, T.U., A.K.M.A. Mannan, M.S. Rahman and A. Haque. 1982. Study of urea treated rice straw in milk production. *Bangladesh Journal of Animal Science*, **11**: 20-27.

Bakshi, M.P.S., V.K. Gupta and P.N. Langar. 1986. Fermented straw as a complete basal ration for ruminants, *Agr. Wastes*, **16**(1): 37-46. DOI: 10.1016/0141-4607(86)90035-1

Bakshi, M.P.S. and M. Wadhwa. 2011. Nutritional status of dairy animals in different regions of Punjab state in India, *Indian J. Anim. Sci*., **81**(1): 52-58.

Behera, P.C., M. Das, D.P. Tripathy, B. Panigrahi and N. Panda. 2012. Mineral supplementation and its relevance in improving conception rate in anestrus and repeat breeding heifers. *Intas Polivet*, **13**(1): 17-21.

Brar, P.S. and A.S. Nanda. 2008. Improving performance of anoestrus buffaloes through supplementary feeding of urea molasses multi-nutrient block. *Indian J. Anim. Sci*., **78**(6): 606-608.

Choudhary, G.K., R.P. Chaudhary and R. Singh. 2018. Evaluation of urea molasses mineral mixture block (UMMMB) and dewormer for improvement in herd fertility in dairy animals - A on farm trial (OFT). *International Journal of Current Microbiology and Applied*, **7**: 149-152. Available on: https://www.ijcmas.com/special/7/Govind%20Kumar%20Choudhary,%20et%20al.pdf

Delgado, C.L., M. Rosegrant, H. Steinfeld, S. Ehui and C. Courbois. 1999. *Livestock to 2020: The Next Food Revolution*. Food Agriculture and Environment Discussion Paper 28, International Food Policy Research Institute, Washington DC, USA.

Devendra, C. and R.A. Leng. 2011. Feed resources for animals in Asia: Issues, strategies for use, intensification and integration for increased productivity. *Asian Austral. J. Anim*., **24**(3): 303-321. DOI: 10.5713/ajas.2011.r.05

Kakkar, V.K., N.S. Malik and G.S. Makkar. 1997. Uromin lick as a replacement of concentrate mixture in buffaloes. *Indian J. Anim. Nutr.*, **14**(3): 203-205.

Khan, M.A.S., S.K. Bain and S.A. Choudhary. 1990. Studies on the effect of feeding urea treated rice straw supplemented with different levels of fishmeal in early lactating dairy cows. *Bangladesh Journal of Animal Science*, **19**(1&2): 119-130.

Kumar, S., A.K. Pandey, W.A.A. Razzque and D.K. Dwivedi. 2011. Importance of micro minerals in reproductive performance of livestock, *Vet. World*, **4**(5): 230-233. DOI: 10.5455/vetworld.2011.230-233

Lamba, J.S., M. Wadhwa and M.P.S. Bakshi. 2002. Effect of feeding naturally fermented urea wheat straw on the productive and reproductive performance of Milch buffaloes. *Bubalus bubalis*, **89**(2): 72-79.

Makkar, G.S. and S. Saijpaul. 1996. Uromin-lick-A success story, *Progressive Farming*, *May*: 22-23.

Ramesh, B.K., T. Thirumalesh and B.N. Suresh. 2009. Effect of feeding urea mineral molasses block on milk production, milk composition and onset of estrus in dairy animals. *Indian J. Anim. Nutr.*, **24**(4):322-326.

Salman, A.D. 2007. *The Role of Multi-Nutrient Blocks for Sheep Production in An Integrated Cereal- Livestock Farming System in Iraq.* Innovations for Poverty Action Agricultural Research Centre, Baghdad, Iraq.

Samantra, C.S., M.K. Mondal and P. Biswas. 2005. Effect of feeding mineral supplementation on the reproductive performance of anestrous cows. *Indian J. Anim. Nutr.*, **22**: 177-184.

Sharma, K., N. Dutta and U. Naulia. 2004. An on-farm appraisal of feeding urea-treated straw to buffaloes during late pregnancy and lactation in a mixed farming system. *Livestock Research for Rural Development*, **16**(11).

Singh, S.P. and S.P. Pachauri. 2011. Effect of feed supplementation at different post calving days on the performance of lactating buffaloes in different seasons. *Indian J. Anim. Res.*, **45**(4): 314-317.

Singh, R., S. Kumar and P.S. Brar. 2010. Evaluation of urea molasses multi-nutrient blocks enriched with area specific mineral mixture in buffaloes, *Indian J. Anim. Sci.*, **80**(6): 561-564.

Snedecor, G.W. and W.G. Cochran. 1994. *Statistical Methods*, 8th ed. Iowa State University Press, London, UK.

Teller, E., J.M. Godeau and R.D.E. Baere. 1980. Effect of administration of urea on the composition of milk. *Dairy Science Abstracts*, **43**: 220.

Tiwari, S.P., U.B. Singh and U.R. Mehra 1990. Urea molasses mineral blocks as a feed supplement: Effect on growth and nutrient utilization in buffalo calves. *Anim. Feed Sci. Tech.*, **29**(3-4): 333-341. DOI: 10.1016/0377-8401(90)90039-B

Toppo, S., A.K. Verma, R.S. Dass and U.R. Mehra. 1997. Nutrient utilization and rumen fermentation pattern in crossbred cattle fed different planes of nutrition supplemented with urea molasses mineral block. *Anim. Feed Sci. Tech.*, **64**(2-4): 101-112. DOI: 10.1016/S0377-8401(96)01070-X

Wanapat, M., A. Petlum. and O. Pimpa. 1999. Strategic supplementation with a high quality feed block on roughage intake, milk yield and composition, and economic return in lactating dairy cows. *Asian Austral. J. Anim.*, **12**(6): 901-903.