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Study on the Effect of UMMB Supplementation on Performance of Buffaloes of Gujjar Tribe of Jammu

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ABSTRACT

The present study was carried out in Agra chack area of R S Pura tehsil of Jammu district of J&K state. The productivity can be increased to greater extent by nutritional management (UMMB feeding). The Urea molasses mineral blocks based on locally available by products were made using standard procedure. The experiment comprised of eighteen female buffaloes of 5-6 years and 2nd -3rd parity. They were divided into three treatments having six animals each. In control (T_0), basal diet was fed to the animals, in Ist group (T_1), urea molasses mineral blocks (UMMB) were offered in last trimester of pregnancy and in 2nd group (T_2), the UMMB were offered postpartum in addition to the basal diet. All supplemented buffaloes gained more body weight (1.59%), body condition score (1.67%) and heart girth than their unsupplemented controls. The UMMB supplementation appeared to have made better difference over controls where animals were already on poor diets. The birth weight and weaning weight of calves born to supplemented animals was significantly higher (30.50% and 23.55% respectively) in comparison to unsupplemented group. The postpartum estrus, conception interval and conception rate reduced in supplemented group than control. The increase in milk yield/ animal/ day was observed to be 1.5l in supplemented group with benefit cost ratio of 1:2.73. Overall, UMMB supplementary feeding during prepartum and postpartum period improved production and reproduction in buffaloes.

HIGHLIGHTS

- Urea molasses mineral blocks improved production and reproduction performance of animals reared by Gujjars.
- Pre-partum supplementation of UMMB improved significant general body condition, milk production and reproductive activity postpartum in buffaloes.

Keywords: Urea molasses mineral block, buffaloes, Gujjars, reproduction, production

The dairy farming plays an important role in the economic development of rural India. More than 70 percent of the rural households still depend on agriculture and livestock sector for their livelihood (FAOSTAT, 2010). India ranks first in buffalo population in the world with 51.05 million milch animals (Annual Report, 2011). They are the main stay of dairy industry and also play a significant role as a draught animal. They contribute 51 percent of the total milk production in India (Annual Report, 2011). The Jammu and Kashmir is one of the largest Union territory of the Indian Union. It lies in Northern India between 32°-15’ and 37°-

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05' N latitude and 72°-35' and 83°-20' E longitude. The Jammu & Kashmir state is blessed with 738.99 thousands population (19th livestock census). These animals are mainly reared by Gujjars, who own about 11.9 percent of the total population of the state (Census of India, 2011). Gujjar are pastoral ethnic group with population in India, Pakistan and a small number in north eastern Afghanistan. They are numerically third largest community of Jammu and Kashmir after Kashmiri Muslims and Dogras (Bhat, 2018). The population of Gujjars in Jammu district is 3.81% of the total population of the district (Census of India, 2011). Buffaloes play a crucial role in economy and social status of Gujjars (Singh, 1993). They rear buffaloes for commercial purposes which is prime source of their livelihood. They sustain on sedentary livestock rearing and prefer to possess maximum numbers of buffaloes which could provide commercially viable quantities of milk. The current level of productivity of buffaloes of Gujjars remains an area of concern as the productivity of their livestock is very low. The lower yield is due to the poor availability of feed and fodder resources in terms of quantity and quality, inferior breed of livestock, poor veterinary facilities and unhygienic conditions (Koundal, 2012). They are still practicing traditional methods of livestock rearing and have no concept of standard management practices on scientific lines viz. heifer management, calf management etc. It has considerably affected the economic potential of Gujjars and they are in the same position in which they were hundreds of years before (Anonymous, 2009). They take their animals for grazing in the morning and return in the evening. So, major nutritional needs of animals are fulfilled by grazing. This seems to be problem with availability of grazing lands is shrinking day by day. Further, the quality of green fodder changes after every three kilometres resulting in non fulfilment of nutritional needs of the buffaloes. In this backdrop, it is apparent that there is a dire need for the strategies to be planned, to pursue the goal of higher milk production, to improve the productive and reproductive condition of their animals, to uplift the economic condition of this tribal community. Introduction of UMMB lick technology is one of the methods developed in recent years to combat the nutritional status of dairy animals. UMMB supplementation in animal feed increases microbial protein in the animal body which saves the expensive concentrates which will be beneficial to the Gujjars economically in long term. UMMB can be fed throughout year but are more beneficially utilized during the dry season or when the animals are grazing low quality pastures. They are convenient in terms of packaging, storage, transport and ease of feeding (Avilla, 2006) as most of members of the community are practicing migratory pattern of living. Therefore, the present study was undertaken to study the traditional livestock management practices followed by tribal Gujjar community to address the nutritional problems of their animals through UMMB supplementation.

MATERIAL AND METHODS

The present study was conducted at Agra chak area of R.S. Pura tehsil of Jammu district (32.63°N and 71.73°E). The duration of experiment was six months. Pleuriparous graded buffaloes (18) of 5 to 6 years of age and in 2nd to 3rd parity were selected for the study. The animals in treatment 1 group (T_1) were supplemented with UMMB in last trimester of pregnancy along with basal diet, the treatment 2 group (T_2) animals were offered UMMB postpartum along with basal diet while control was fed basal diet. Each group included 6 animals each. The UMMB were prepared by cold process as per the method described by Sansoucy (1986). The ingredients included molasses, urea, dicalcium phosphate, mustard oil cake, limestone powder, mineral mixture, rice husk, maize, salt and cement. A 2.5 kg diameter of 20 × 35 cm height 6.5-7 cm, rectangle shaped UMMB was offered to each animal daily and the intake was calculated from the leftover after 24 h. On routine conventional diet without UMMB supplementation 5 buffaloes were kept. The basal diet included 30 to 40 kg green fodder (sorghum or maize) along with 2 kg concentrate mixture. Observations were made on body weight (range 0-1 000 kg), body condition score (BCS; 1-5 point scale; Edmondson *et al.* 1989) and heart girth (using a rubber tapes) at weekly intervals. The milk yield postpartum was recorded daily in the morning at 6-7 AM and in the evening at 6-7 PM. The milking of individual buffaloes was done by hand milking. Blood samples (10-15 ml) were collected at the start and at the end of the experiment by jugular venipuncture into heparinised polystyrene tubes (1: 1000). The samples immediately after collection were cooled by placing the vials in ice. Within 6h of collection, blood samples were centrifuged at 3000 rpm for 15 minutes and serum was separated. The serum was transferred into plastic vials and stored at -20°C until assayed. The Blood urea was estimated by GLDH-Urease method using analytical kits of Erba Mannheim, Solan (H.P.), India. The results are expressed in mg/dl. Milk was collected from all the animals on day 7th of parturition and thereafter fortnightly till 60 days postpartum for milk urea nitrogen estimation. Milk samples were taken from whole milk after complete milking. The milk urea was estimated by GLDH-Urease method using analytical kits of Erba Mannheim, Solan (H.P.), India. The results are expressed in mg/dl. The postpartum lactating buffaloes were kept under observation for oestrus detection using visual observation at 6 hours interval from 6AM to 6 PM in a day. Standing or observable estrus was considered to have occurred when the buffalo cow stood to be mounted. The conception rate was calculated by percentage of buffaloes that conceived insemination at estrus in each group. Pregnancy was confirmed by rectal palpation at 60 days post insemination. The calving to conception interval was the average time from calving to successful insemination. It was calculated from date of calving to date of conception. The data was analysed by one way ANOVA using (SPSS-16, IBM Inc.)

RESULTS AND DISCUSSION

Average feed intake

The digestibility and the rate at which fibrous feed is broken down to the particle size are considered as the primary limiting factors of the dry matter intake of fibrous feed. Average dry matter intake of buffaloes ranged from 18.13 ±0.17 kg in group I and 17.53±0.03 kg in control respectively. Significant difference was observed in group I and control. Similarly average feed intake in fresh matter basis was found to be 33.85 ±0.46 kg in treatment 1 and 33.57±0.07 kg in control. The average UMMB intake was found to be 0. 38 ±0.00 kg on fresh matter basis and 0.32±0.00 kg on dry matter basis One of the most efficient ways of increasing the feeding value of crop residues is to supplement it with UMMB (Bakshi and Wadhwa, 2011). Further with UMMB supplementation, digestibility increased to 50% (Bresciani and Valdes, 2007). As per findings of Meel *et al*. (2015), the availability of molasses, urea and minerals as a source of energy, protein and minerals through UMMB optimize rumen fermentation and increase utilization of crop residues. Tebeka *et al*. (2013), concluded that UMMB supplementation improved dry matter intake and energy intake of cows. Similar findings were observed by Mengistu *et al.* (2018) who concluded that significant increase in dry matter intake was observed as a result of UMMB supplementation. According to Akter *et al*. (2004), UMMB lick supplementation of straw based diet increases digestibility, feed intake, live weight gain and net return and macro and micro minerals can be easily incorporated in the blocks thereby correcting multinutrient deficiencies of ruminants in developing countries. Average dry matter intake of buffaloes ranged from 18.13 ±0.17 kg in group I and 17.53±0.03 kg in control respectively. Significant difference was observed in group I and control Similarly average feed intake in fresh matter basis was found to be 33.85 ±0.46 kg in treatment 1 and 33.57±0.07 kg in control. The average UMMB intake was found to be 0. 38 ±0.00 kg on fresh matter basis and 0.32±0.00 kg on dry matter basis. Average dry matter intake of buffaloes ranged from 15.69±0.03 in group II and 15.60±0.05 in control and it differed significantly. Further, the feed intake on fresh matter basis was found to be 30.04±0.04 kg in group II and 29.58±0.07 kg in control and it varied significantly. The average UMMB intake was found to be 0.38 ±0.00 kg on fresh matter basis and 0.33 ±0.00 kg on dry matter basis.

Changes in heart girth

During the study, the higher values were observed in the supplemented group in comparison to control. The findings of the present study were in accordance with Haili *et al.* (2014), who concluded that the UMMB supplementation improved the heart girth of the animals. Meningsitu *et al.* (2018) also concluded that the body weight, body length, heart girth, height at hip cross, height at sacrum, circumference of cannon bone, hip width, rump length and hip bone width were all higher in experimental group fed with UMMB than in control group. The results of Firdous *et al*. (2010) show that the heart girth was higher in group supplemented with UMMB. The heart girth gain in cow calves was 0.24±0.02 cm and 0.30±0.03 cm respectively ($p \geq 0.05$). Significant difference was observed in parity 2 and parity 3 during 1st, 2nd, 3rd, 4th, 5th and 6th week in control group. It could be due to postural changes in animals at the time of measuring the heart girth. The gain in heart girth was observed in prepartum period which decreased in postpartum .Similar results were observed by Brar *et al.* (2006) who found that animals gained girth towards parturition and it decreased postpartum.

Table 1: Average feed intake (kg) of the experimental buffaloes (Prepartum)

	Body weight	Fresh matter basis (FMB)					Dry matter basis (DMB)				
		Concentrate	Dry fodder	Green fodder	UMMB	Total	Concentrate	Dry fodder	Green fodder	UMMB	Total
Group I	592.3 ± 0.60^{B}	2.45 ± 0.03	8.30 ± 0.01^{B}	22.72 ± 0.44	0.38 ± 0.00	33.85 ± 0.26	2.21 ± 0.02	7.43 ± 0.01^{B}	8.12 ± 0.03	0.32 ± 0.00	18.13 ± 0.17^{B}
Control	583.8 ± 0.75^{A}	2.45 ± 0.01	8.04 ± 0.02^{A}	23.08 ± 0.07	0	33.57 ± 0.07	2.20 ± 0.01	7.24 ± 0.02^{A}	8.08 ± 0.02	0	17.53 ± 0.03^{A}

Mean bearing superscript (A, B) differ significantly with each other (P<0.05).

Table 2: Average feed intake (kg) of the experimental buffaloes (Postpartum)

	Body weight	Fresh matter basis (FMB)					Dry matter basis (DMB)				
		Concentrate	Dry fodder	Green fodder	UMMB	Total	Concentrate	Dry fodder	Green fodder	UMMB	Total
Group II	521.56 ± 0.29	1.82 ± 0.04	7.81 ± 0.01	20.02 ± 0.02	0.38 ± 0.0	30.04 ± 0.04^{B}	1.64 ± 0.01	7.03 ± 0.00	7.008 ± 0.0	0.33 ± 0.0	15.68 ± 0.02
Control	519.67 ± 1.78	1.74 ± 0.05	7.78 ± 0.01	20.06 ± 0.04	0	29.58 ± 0.07^{A}	1.56 ± 0.01	7.01 ± 0.00	7.02 ± 0.0	0	15.60 ± 0.05

Mean bearing superscript (A, B) differ significantly with each other (P<0.05).

Changes in body weight

The gain in the body weight was higher in supplemented group in comparison to control in prepartum period. However the body weight decreased sharply after parturition and it further declined postpartum. But the loss in body weight was higher in control in comparison to supplemented group. The sharp decrease in body weight after parturition is physiological owing to expulsion of foetus, placenta and foetal fluids. The findings of the present study are in line with Ghosh *et al*. (1993) who observed decrease in body weight by 4.8% during the period of three months after calving in cows supplemented with UMMB. Similar findings were observed by Mengistu *et al*. (2018) who reported significant difference in body weight in supplemented and control groups after UMMB supplementation. Hailli *et al*. (2014) showed that weight gain was significantly higher in experiment group than in control group during the period of experiment. Similarly, Liuet *et al*. (2001) reported that UMMB lick supplementation increased weight in supplemented group in comparison to control group under grazing conditions. Yadav *et al*. (2011) found similar results with lactating buffaloes supplemented with UMMB. The present findings are in agreement with Lawania *et al*. (2017) who studied efficacy of UMMB on body weight and they found that the gain in body weight was significantly higher in supplemented group in comparison to control under field conditions.

Changes in body condition score

The body condition scoring system is the means of determining body condition of dairy animals independent of body weight or frame size. In the present study, the BCS was significantly higher in treatment groups in comparison to control groups. Similarly as per Akter *et al.* (2004), the UMMB supplementation improved the BCS in treatment groups because the animals got the additional nutrients from UMMB such as energy, nitrogen, minerals etc. the values of BCS increased up to parturition and it decreased further (Khan *et al.,* 2015). Similar results were found by Uperti *et al.* (2010), who reported that UMMB supplementation helped in improving BCS from 2.5 to 3.5 scales. As per Bheekhee *et al.* (2010), most of the animals in their study had fairly good body condition scores ranging from 2.5 to 3.5.

Table 3: Effect of prepartum UMMB supplementation on heart girth (inches) of buffaloes

Group	Weeks											
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Group 1	83 ± 0.37	83 ± 0.36	83 ± 0.36	83 ± 0.36	83.4 ± 0.37	83.53 ± 0.40	83.53 ± 0.40	83.63 ± 0.39	83.68 ± 0.40	83.83 ± 0.42	83.917 ± 0.4	84.0 ± 0.36^{B}
Parity 2	83 ± 0.57	83 ± 0.57	83 ± 0.57	83 ± 0.57	83.43 ± 0.57	83.567 ± 0.64	83.567 ± 0.63	83.63 ± 0.63	83.73 ± 0.66	83.867 ± 0.69	83.93 ± 0.63	84.00 ± 0.57
Parity3	83.0 ± 0.57	83.0 ± 0.57	83.00 ± 0.57	83.0 ± 0.57	83.36 ± 0.60	83.50 ± 0.64	83.50 ± 0.63	83.633 ± 0.60	83.63 ± 0.60	83.80 ± 0.63	83.90 ± 0.63	84.00 ± 0.57
Control	82.5 ± 0.22	82.5 ± 0.23	82.65 ± 0.25	82 ± 0.25	82.73 ± 0.26	82.733 ± 0.26	82.61 ± 0.25	82.61 ± 0.25	82.65 ± 0.26	82.80 ± 0.24	82.90 ± 0.23	82.95 ± 0.64^{A}
Parity 2	82 ± 0.00^{a}	82 ± 0.00^{a}	82.13 ± 0.13^{a}	82.13 ± 0.13^{a}	82.167 ± 0.12^{a}	82.167 ± 0.12^{a}	82.20 ± 0.15	82.20 ± 0.15	82.20 ± 0.15	82.367 ± 0.12	82.50 ± 0.15	82.50 ± 0.15
Parity 3	83.0 ± 0.00^{b}	83.0 ± 0.0^{b}	83.167 ± 0.08^{b}	83.16 ± 0.08^{b}	83.30 ± 0.05^{b}	83.30 ± 0.05^{b}	83.03 ± 0.37	83.03 ± 0.37	83.10 ± 0.36	83.23 ± 0.31	83.30 ± 0.30	83.40 ± 0.35

Mean bearing superscript (a, b) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B) differ significantly between groups (P<0.05).

Table 4: Effect of postpartum UMMB supplementation on heart girth (inches) of buffaloes

Group	Weeks											
	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th
Group I	82.50 ± 0.22^{d}	82.40 ± 0.21^{d}	82.40 ± 0.2^{1}d	82.317 ± 0.20^{d}	82.067 ± 0.14^{cd}	81.883 ± 0.18^{bcd}	81.717 ± 0.17^{bc}	81.450 ± 0.16^{Ab}	81.317 ± 0.16^{b}	81.317 ± 0.16^{Ab}	81.100 ± 0.15^{a}	80.700 ± 0.17^{Aa}
Parity 2	82.66 ± 0.33	82.56 ± 0.28	82.56 ± 0.28	82.46 ± 0.28	82.23 ± 0.1 8	82.20 ± 0.20	82.00 ± 0.20	81.70 ± 0.23	81.53 ± 0.26	81.53 ± 0.26	81.30 ± 0.26	80.70 ± 0.37
Parity 3	82.33 ± 0.33	82.23 ± 0.33	82.23 ± 0.33	82.16 ± 0.31	81.90 ± 0.20	81.56 ± 0.16	81.43 ± 0.18	81.20 ± 0.15	81.10 ± 0.15	81.10 ± 0.15	80.90 ± 0.10	80.70 ± 07.05
Group II	82.50 ± 0.22	82.40 ± 0.21	82.40 ± 0.21	82.317 ± 0.20	82.283 ± 0.20	82.283 ± 0.20	82.283 ± 0.20	82.217 ± 0.20^{B}	81.867 ± 0.19	82.183 ± 0.20^{B}	81.733 ± 0.22	82.117 ± 0.23^{B}
Parity 2	82.66 ± 0.33	82.60 ± 0.30	82.60 ± 0.30	82.50 ± 0.30	82.43 ± 0.31	82.43 ± 0.31	82.43 ± 0.31	82.36 ± 0.33	82.00 ± 0.35	82.33 ± 0.31	81.43 ± 0.27	82.23 ± 0.41
Parity 3	82.66 ± 0.33	82.20 ± 0.30	82.20 ± 0.30	82.13 ± 0.28	82.13 ± 0.28	82.13 ± 0.28	82.13 ± 0.28	82.06 ± 0.26	81.73 ± 0.24	82.03 ± 0.28	82.03 ± 0.28	82.00 ± 0.30
Control	82.33± 0.21^{d}	82.33± 0.21^{d}	82.233± 0.19^{d}	82.100± 0.19^{cd}	82.100± 0.19^{cd}	82.100± 0.19^{cd}	81.850 ± 0.16^{bcd}	81.600 ± 0.16^{Abc}	81.600 ± 0.16^{bc}	81.317 ± 0.16^{Aab}	81.317 ± 0.16^{ab}	80.933 ± 0.15^{Aa}
Parity 2	82.33± 0.33	82.33 ± 0.33	82.23 ± 0.33	82.10 ± 0.30	82.10 ± 0.30	82.10 ± 0.30	81.80 ± 0.26	81.46 ± 0.29	81.46 ± 0.29	81.23 ± 0.29	81.23 ± 0.29	80.73 ± 0.16
Parity 3	82.33± 0.33	82.33 ± 0.33	82.23 ± 0.28	82.10± 0.30	82.10 ± 0.30	82.10 ± 0.30	81.90 ± 0.25	81.73 ± 0.18	81.73 ± 0.18	81.40 ± 0.20	81.40 ± 0.20	81.13 ± 0.24

Mean bearing superscript (a, b,c,d) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B) differ significantly between groups (P<0.05).

Birth weight and weaning weight of calves

The findings of the study are in line with Akter *et al*. (2004) who observed significant difference between control and treated group. Highest live weight was found for UMMB group. Miah *et al*. (2000) reported that due to supplementation of UMMB, the birth weight of calves in the supplemented group was significantly higher than in the control group. As per Sikka and Lal (2006), supplementation of dams has been observed to enhance secretion of immune proteins, immunoglobulin (Ig) in the colostrums by 80% and improve growth and immune

Table 5: Effect of prepartum UMMB supplementation on body weight (kg) of buffaloes

Group	Weeks											
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Group 1	591.5 ± 3.71	592.07 ± 3.58	593.67 ± 3.52	594.3 ± 3.67	595.667 ± 3.82	597.16 ± 3.85	598.66 ± 3.62	600.16 ± 3.31	601.33 ± 2.97	602.66 ± 2.89	604.83 ± 2.71^{A}	606.50 ± 2.54^{A}
Parity 2	590.3 ± 5.81	590.82 ± 5.65	591.84 ± 5.33	592.3 ± 5.48	593.33 ± 6.06	595.66 ± 5.54	597.33 ± 5.23	599.33 ± 4.66	600.33 ± 4.48	601.33 ± 4.37	603.667 ± 4.25	606.00 ± 3.60
Parity 3	590.3 ± 5.81	590.82 ± 5.65	591.84 ± 5.33	592.3 ± 5.48	593.33 ± 6.06	595.66 ± 5.54	597.33 ± 5.23	599.33 ± 4.66	600.33 ± 4.48	601.33 ± 4.37	603.66 ± 4.25	606.00 ± 3.60
Control	582.3 ± 1.4	583.50 ± 1.72	585.33 ± 1.72	587.0 ± 1.78	588.33 ± 1.90	590.16 ± 1.81	592.00 ± 1.77	594.16 ± 1.70	595.16 ± 1.85	595.66 ± 1.85	596.83 ± 1.95^{B}	597.83 ± 1.95^{B}
Parity 2	584.3 ± 2.72	585.33 ± 3.18	587.33 ± 3.18	589.3 ± 3.18	590.66 ± 3.38	592.33 ± 3.28	593.66 ± 3.38	595.66 ± 3.38	597.00 ± 3.51	597.66 ± 3.33	599.00 ± 3.51	600.00 ± 3.51
Parity 3	581.3 ± 1.20	581.66 ± 1.20	583.33 ± 0.88	584.6 ± 0.66	586.00 ± 1.15	588.00 ± 1.00	590.33 ± 1.20	592.66 ± 0.88	593.33 ± 1.20	593.66 ± 1.45	594.66 ± 1.45	595.66 ± 6.25

Mean bearing superscript (A, B) differ significantly between groups ($P<0.05$).

Table 6: Effect of postpartum UMMB supplementation on body weight (kg) of buffaloes

Group	Weeks											
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Group 1	528.00 ± 1.48	525.5^{B} ± 1.11	523.16^{B} ± 1.19	520.6^{B} ± 1.11	520.83^{B} ± 1.10	520.6^{B} ± 0.66	520.6^{B} ± 0.55	520.6^{B} ± 0.55	521.16^{B} ± 0.65	521.16^{B} ± 0.65	521.1^{B} ± 0.65	520.6^{B} ± 0.49
Parity 2	528.33 ± 1.45	525.66 ± 1.20	523.00 ± 1.52	520.00 ± 1.00	520.00 ± 1.52	520.33 ± 0.88	520.66 ± 0.88	520.66 ± 0.88	521.33 ± 0.88	521.33 ± 0.88	521.33 ± 0.88	520.66 ± 0.66
Parity 3	527.66 ± 2.96	525.33 ± 2.18	523.33 ± 2.18	521.33 ± 2.18	521.66 ± 1.76	521.00 ± 1.11	520.66 ± 0.88	520.66 ± 0.88	521.00 ± 1.15	521.00 ± 1.15	521.00 ± 1.15	520.66 ± 0.88
Group 2	521.66^{A} ± 0.66	522.0^{A} ± 0.68	521.00^{B} ± 0.81	519.5^{B} ± 0.71	521.66^{B} ± 1.11	521.8^{B} ± 0.98	521.6^{B} ± 0.80	521.6^{B} ± 0.80	528.33^{B} ± 1.22	526.66^{B} ± 1.17	523.83^{B} ± 1.13	521.50^{B} ± 1.14
Parity 2	521.66 ± 1.20	521.66 ± 1.20	520.33 ± 1.45	519.00 ± 1.15	521.00 ± 1.73	521.00 ± 2.64	520.66 ± 1.20	520.66 ± 2.08	528.00 ± 2.30	526.33 ± 2.33	523.33 ± 2.18	521.33 ± 2.18
Parity 3	521.66 ± 0.88	522.33 ± 0.88	521.66 ± 0.88	520.00 ± 1.00	522.33 ± 1.66	522.66 ± 1.33	522.66 ± 0.88	522.66 ± 0.88	528.66 ± 1.45	527.00 ± 1.15	524.33 ± 1.20	521.66 ± 1.33
Control	522.83^{A} ± 1.37	519.5^{A} ± 0.95	516.66^{A} ± 0.76	513.5^{A} ± 1.05	513.50^{A} ± 1.05	513.3^{A} ± 1.05	513.5^{A} ± 0.99	513.1^{A} ± 1.07	513.33^{A} ± 0.66	513.16^{A} ± 0.65	513.5^{A} ± 0.80	513.5^{A} ± 0.80
Parity 2	521.00 ± 1.73	518.33 ± 0.66	515.33^{a} ± 0.33	513.00 ± 1.00	512.66 ± 0.88	512.66 ± 0.88	512.66 ± 0.33	512.33 ± 0.88	512.66 ± 0.66	512.33 ± 0.33	512.66 ± 0.66	512.66 ± 0.66
Parity 3	524.66 ± 1.76	520.66 ± 1.66	518.00^{b} ± 1.00	514.00 ± 2.08	514.33 ± 2.02	514.00 ± 2.08	514.33 ± 2.02	514.00 ± 2.08	514.00 ± 1.15	514.00 ± 1.15	514.33 ± 1.45	514.33 ± 1.45

Mean bearing superscript (a, b) differ significantly between parity within groups ($P<0.05$); Mean bearing superscript (A, B) differ significantly between groups ($P<0.05$).

status of calves. Similar results were obtained by Khan *et al.*(2015) who concluded that calves born to supplemented buffaloes performed well in terms of their birth weight and body weight gain up to 90 days.

Milk yield of buffaloes

During the study, the prepartum supplemented group (T1) showed higher values throughout the period and minimum in control. Similar findings were observed by Sahoo *et al.* (2009). He found significantly increased milk yield in cows receiving home made mixture and grass hay supplemented with urea molasses mineral block @ 300 g/day/ animal than that of control cows. Khanal *et al*. (2017), also reported that higher milk production was recorded in buffaloes without UMMB supplementation

Table 7: Effect of prepartum and postpartum UMMB supplementation on body condition score of buffaloes

Treatment	Prepartum (Monthly)			Postpartum (Monthly)		
	1st	2nd	3rd	1st	2nd	3rd
Treatment 1	3.45 ± 0.02^{a}	3.53 ± 0.02^{bB}	3.65 ± 0.02^{Bc}	3.03 ± 0.02	3.04 ± 0.024^{B}	3.03 ± 0.0217^{B}
Parity 2	3.46 ± 0.03	3.56 ± 0.03	3.66 ± .03	3.03 ± 0.03	3.02 ± 0.037	3.03 ± 0.035
Parity 3	3.43 ± 0.03	3.50 ± 0.00	3.63 ± 0.03	3.033 ± 0.03	3.06 ± 0.033	3.03 ± 0.033
Treatment 2	—	—	—	3.03 ± 0.05	3.02 ± 0.0115^{B}	3.02 ± 0.00847^{B}
Parity 2	—	—	—	2.99 ± 0.003	2.94 ± 0.011	2.93 ± 0.008
Parity 3	—	—	—	3.06 ± 0.03	2.96 ± 0.02	2.95 ± 0.01
Control	3.41 ± 0.03	3.41 ± 0.03^{A}	3.450 ± 0.03^{A}	2.98 ± 0.0047	2.95 ± 0.018^{A}	2.96 ± 0.0165^{A}
Parity 2	3.36 ± 0.03	3.36 ± 0.03	3.40 ± 0.05	2.98 ± 0.008	2.96 ± 0.024	2.97 ± 0.025
Parity 3	3.46 ± 0.03	3.46 ± 0.03	3.50 ± 0.00	2.99 ± 0.005	2.94 ± 0.029	2.95 ± o.108

Mean bearing superscript (a, b, c) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B) differ significantly between groups (P<0.05).

Table 8: Effect of prepartum and postpartum UMMB supplementation on birth weight (kg) and weaning weight (kg) of buffaloes

Treatment	Birth Weight	Weaning Weight
Treatment 1	38.50 ± 0.885^{B}	49.83 ± 1.108^{B}
Parity 2	37.00 ± 0.577	47.66 ± 0.333^{a}
Parity 3	40.00 ± 1.155	52.00 ± 1.155^{b}
Male	38.75 ± 1.377	50.25 ± 1.652
Female	38.00 ± 0.00	49.00 ± 1.00
Treatment 2	30.00 ± 0.775^{A}	40.66 ± 0.989^{A}
Parity 2	29.33 ± 0.333	40.00 ± 2.00
Parity 3	30.66 ± 0.882	41.33 ± 0.667
Male	29.33 ± 0.882	40.00 ± 1.155
Female	30.66 ± 1.33	41.33 ± 1.764
Control	29.50 ± 0.619^{A}	40.33 ± 0.615^{A}
Parity 2	29.66 ± 1.202	40.00 ± 1.155
Parity 3	29.33 ± 0.667	40.66 ± 0.667
Male	31.00 ± 1.000	42.00 ± 0.00^{b}

Mean bearing superscript (A, B,C) differ significantly between groups (P<0.05).

(control group). According to Brar *et al.* (2008), the total average milk produced in the first 30 days of lactation in the UMMB supplemented buffaloes was more than the corresponding controls. On an average, each supplemented buffaloes produced 30 kg more milk during the Ist month and 88 kg more milk over the 60 days period as compared to the unsupplemented controls. The on farm trial was conducted by Choudhary *et al*. (2018), and they came to conclusion that UMMB improved the milk yield in the supplemented dairy animals. Misra *et al.* (2006), reported that the supplementation of UMMB licks increased milk yield in crossbred cows during the dry season feeding in agro ecosystem in India. Nutritionally stressed lactating animals resumed milk production after UMMB feeding. As per the studies of Mengistu *et al.* (2018) the UMMB supplementation has a positive effect on the milk production performance of cows. Meel *et al*. (2015), reported significant increase in the milk yield by 15.94% in the treatment group suggesting that the supplementation of UMMB improved the milk yield of animals. Tebeka *et al*. (2013), found that the milk production performance of the dairy cows was significantly improved by UMMB supplementation by 0.6 and 1.65 litre per cow per day for forega and crossbred dairy cows respectively. Based on the research conducted by Uperti *et al*. (2010), the average daily milk increment of 1.11 of milk was obtained in UMMB supplemented group.

Table 9: Effect of prepartum and postpartum UMMB supplementation on milk yield (Kg/day)(1st month)

Treatments	Weeks			
	1st	**2nd**	**3rd**	**4th**
Treatment 1	8.781± 0.012^{A}	8.71±0.031^{A}	8.70±0.0031^{A}	8.70±0.017^{A}
Parity 2	8.762±0.126	8.67±0.0561	8.71±0.004	8.71±0.028
Parity 3	8.80±0.014	8.75±0.0190	8.70±0.004	8.70±0.024
Treatment 2	7.85±0.015^{B}	7.81±0.0158^{B}	7.72±0.0374^{B}	7.76±0.018^{B}
Parity 2	7.85±0.0286	7.84±0.0252	7.76±0.033	7.76±0.03
Parity 3	7.848±0.0172	7.79±0.0126	7.67±0.0619	7.75±0.023
Control	7.65±0.036^{C}	7.66±0.0384^{C}	7.68±0.0281^{C}	7.71±0.021^{C}
Parity 2	7.60±0.0541	7.624±0.0762	7.67±0.036	7.72±0.031
Parity 3	7.70±0.029	7.69±0.0172	7.70±0.049	7.70±0.033

Mean bearing superscript (a, b) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B, C) differ significantly between groups (P<0.05).

Table 10: Effect of prepartum and postpartum UMMB supplementation on milk yield (Kg/day) (2nd Month)

Treatments	Weeks			
	1st	**2nd**	**3rd**	**4th**
Treatment 1	8.80±0.02^{A}	9.04±0.01^{A}	9.13±0.02^{A}	9.22±0.01^{A}
Parity 2	8.82±0.04	9.05±0.03	9.15±0.04	9.24±0.02
Parity 3	8.79±0.02	9.02±0.02	9.11±0.03	9.20±0.00
Treatment 2	7.86±0.01^{B}	8.03±0.02^{B}	8.14±0.03^{B}	8.30±0.02^{B}
Parity 2	7.87±0.01	8.04±0.01	8.15±0.02	8.29±0.03
Parity 3	7.84±0.02	8.02±0.04	8.14±0.07	8.31±0.03
Control	7.80±0.01^{C}	7.94±0.04^{C}	8.02±0.03^{C}	8.15±0.03^{C}
Parity 2	7.80±0.00	7.96±0.05	8.00±0.02	8.07±0.01^{a}
Parity 3	7.80±0.02	7.92±0.07	8.04±0.07	8.22±0.02^{b}

Mean bearing superscript (a, b) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B, C) differ significantly between groups (P<0.05).

Table 11: Effect of prepartum and postpartum UMMB supplementation on milk yield (Kg/day) (3rd Month)

Treatments	WEEKS			
	1st	**2nd**	**3rd**	**4th**
Treatment 1	9.21±0.01^{A}	9.19±0.03^{A}	9.19±0.03^{A}	9.10±0.03^{A}
Parity 2	9.23±0.02	9.21±0.05	9.20±0.06	9.09±0.06
Parity 3	9.20±0.00	9.18±0.23	9.19±0.01	9.12±0.05
Treatment 2	8.32±0.03^{B}	8.33±0.03^{B}	8.33±0.02^{B}	8.25±0.02^{B}
Parity 2	8.32±0.03	8.37±0.03	8.35±0.02	8.25±0.02
Parity 3	8.31±0.03	8.29±0.03	8.32±0.03	8.25±0.04
Control	8.14±0.04^{C}	8.16±0.04^{C}	8.13±0.04^{C}	8.13±0.05^{C}
Parity 2	8.06±0.02^{b}	8.09±0.01^{b}	8.06±0.03	8.07±0.07
Parity 3	8.22±0.02^{a}	8.23±0.03^{a}	8.21±0.05	8.20±0.06

Mean bearing superscript (a, b) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B, C) differ significantly between groups (P<0.05).

Changes in Blood urea Nitrogen

In dairy cattle, blood urea reflects not only catabolism of protein by the ruminant tissues but also the breakdown of protein and non protein nitrogen within the rumen by microorganisms. The rumen ammonia can be utilized by rumen microbes depending upon its release rate and availability of precursors for synthesis of microbial protein or can be absorbed into the blood stream. The findings of the present study corroborated with Hosmani *et al*. (1998), who observed higher concentration of blood urea in Murrah buffaloes fed with UMMB than that of buffaloes fed on wheat straw based ration along with mineral mixture and common salt. As per findings of Parera *et al.* (1998), the BUN level of the UMMB supplemented animals increased in response to supplementation. Similarly, Mohini and Gupta (1993), observed an increase in blood urea nitrogen concentration in UMMB supplemented animals but the values were within the physiological limits. A positive relation was observed between blood urea nitrogen and dietary CP levels in ruminants by Promkot and Wanapat (2005). As per the studies of Sankar, V. (2014), the blood urea levels at 60 and 120 days post feeding were significantly higher as compared to 0 day. Wadhwa *et al.* (2014) studied the nutritional evaluation of UMMB on buffaloes and concluded that BUN concentration was high in all the supplemented groups.

Table 12: Effect of prepartum and postpartum UMMB supplementation on blood urea nitrogen (mg/dl) of buffaloes

Treatment and Parity	Initial	Final
Treatment 1	19.66±0.66	22.33±0.558^{B}
Parity 2	20.00±1.155	22.67±0.67
Parity 3	19.33±0.88	21.00±1.00
Treatment 2	21.33±0.882	23.66±0.667^{B}
Parity 2	23.00±0.58^{b}	23.67±0.88
Parity 3	19.67±0.88^{a}	23.67±1.20
Control	19.83±0.47	11.00±0.632^{A}
Parity 2	19.67±0.88	11.33±0.88
Parity 3	21.00±0.57	11.67±0.88

Mean bearing superscript (a, b) differ significantly between parity within groups (P<0.05); Mean bearing superscript (A, B) differ significantly between groups (P<0.05).

Changes in Milk Urea Nitrogen

The MUN concentration represents the balance between energy and nitrogen in the rumen as well as the metabolism of absorbed amino acids in liver. The majority of microbial protein and rumen un-degradable protein is broken down into amino acids and small peptides in the small intestine, and then used for synthesis of tissue or milk proteins. The remaining amino acids are de-aminated to generate energy and ammonia and then the ammonia is converted to urea in the liver which becomes the source of BUN and MUN. The MUN values observed in the present study are within the normal range of 10 to 16 mg/dl (Donna, 2011), and thus was probably not physiologically significant. Similar findings were observed by Suppada *et al.* (2018).

Table 13: Effect of prepartum and postpartum UMMB supplementation on milk urea nitrogen (mg/dl) of buffaloes

Treatments	1st month	2nd month	3rd month
T_1	14.62±0.51^{B}	14.58±0.63^{B}	14.25±0.63^{B}
T_2	13.16±0.40^{B}	13.33±0.51^{B}	14.82±0.51^{B}
C	10.33±0.51^{A}	10.50±0.54^{A}	10.51±0.54^{A}

Mean bearing superscript (A, B) differ significantly between groups (P<0.05)

Effect of prepartum and postpartum UMMB supplementation on reproductive performance of buffaloes

The postpartum period is the important phase in the reproductive cycle of the dairy animal. It is mainly affected by the nutritional status of the dairy animal, environment, disease condition etc. Body reserves are required to meet the needs of the milk production. They will be mobilised if proper feed intake is not provided to the animal. Hence it will adversely affect the productive and reproductive performance of the animal. In order to prevent this, the dairy animal should have enough body reserves before parturition and enough feed intake after parturition to meet the energy demands of the body (Staples *et al.,* 1998). UMMB being a good source of energy and protein is considered to improve the rumen microflora and increased dry matter intake in the ruminants. Similar findings were observed by Brar *et al.* (2006) who observed that the buffaloes in respective groups came into oestrus on an average 34.33±2.56 (range 23-49) and 48.25±5.25 (range 34-57) days postpartum respectively. The supplemental buffaloes came into heat earlier in comparison to control. When buffaloes were supplemented with urea molasses mineral blocks, 40% cows showed behavioural oestrus as compared to 10% in control in India (Salman, 2007).

Table 14: Effect of prepartum and postpartum UMMB supplementation on days to oestrus (days), calving to conception interval (days) and conception rate (%)

Treatment and Parity	Days to oestrus	Calving to conception interval	Conception rate(%)
Treatment 1	$35.33±1.801^{A}$	$71.33±3.138^{A}$	57.25
Parity 2	36.33±3.712	70.00±4.163	56.7
Parity 3	34.33±1.202	72.66±5.487	58.8
Treatment 2	$45.50±2.094^{B}$	$83.00±1.342^{B}$	51.2
Parity 2	43.66±4.256	84.00±2.00	52.5
Parity 3	47.33±0.667	82.00±2.00	48.4
Control	$47.83±1.887^{B}$	$84.33±2.591^{B}$	41.45
Parity 2	48.33±0.33	86.00±3.00	40.5
Parity 3	47.33±4.177	82.66±4.667	42.4

Mean bearing superscript (A, B) differ significantly between groups ($P<0.05$).

According to Tebeka *et al.* (2013), the UMMB improved the overall productive and reproductive performance of crosssbred cows. Similar findings were observed by Misra *et al.* (2006). The calving to conception interval was also significantly reduced in treatment 1 in comparison to control. The findings are further supported by Mengistu *et al*. (2018), who reported that significant decline in the mean calving to conception interval was observed in the supplemented group in comparison to control. According to Kumar *et al.* (2018), the postpartum estrus was significantly reduced in UMMB treatment groups in comparison to control. It may be due to supplementation of minerals and nutrients through UMMB blocks. Further, the increase in conception rate was also observed which are in line with the present study. The increase in milk production and reduction in reproductive interval in crosssbred cattle was reported after UMMB supplementation (Miah *et al.,* 2000). Lawania *et al*. (2017) found that the mean duration of postpartum oestrus period and services per conception was higher in control group than the experimental group. The improvement in reproductive efficiency may be attributed to the beneficial action of supplemented minerals, crude protein and reproductive function.

CONCLUSION

From the summary of the findings, it was observed that all the supplemented buffalo gained more body weight, body condition score and heart girth in comparison to control animals. The body weight gain was higher in supplemented group in comparison to control. The milk yield was significantly higher in supplemented groups. Further, significant difference was observed in birth weight and weaning weight of calves in supplemented group when compared to control. The profit of about ₹ 45 animal/day was observed in UMMB supplemented group.

RECOMMENDATIONS

The productivity of their animals can be improved to great extent with the help of nutrition management, as balanced feeding is one of the most important determinant in profit in the livestock farming and it plays a pivotal role for economic milk production to make dairy farming a successful enterprise because feed cost accounts about 75 per cent of milk production in cattle and buffaloes. The feeding of urea molasses mineral blocks has shown promising results in improving the nutrient utilization and also productivity of animals. It provides adequate nutrients to the animals for improving their growth and exploiting their full production potential. UMMB can be fed throughout year but are more beneficially utilized during the dry season or when the animals are grazing low quality pastures. They are convenient in terms of packaging, storage, transport and ease of feeding as most of members of the community are practicing migratory pattern of living. All the supplemented buffalo gained more body weight, body condition score and heart girth in comparison to control animals. Further, the milk yield of animals of supplemented group improved in comparison to control. Overall, the UMMB supplementation improved the productive and reproductive performance of buffaloes of Gujjars

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