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## Effect of urea molasses mineral block supplementation on milk production of buffaloes (*Bubalus bubalis*) in central part of Uttar Pradesh

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**Abstract**

This experiment aimed to determine the effect of urea molasses mineral block (UMMB) supplementation on milk production of buffalo (*Bubalus bubalis*). Twenty dairy buffalo were allocated into two groups (control and UMMB). The buffalo from the control group were fed only a basal diet, and the buffalo from treatment group were fed a basal diet with supplementation of UMMB. This experiment lasted for 3 months, and average daily milk yield (liters/day) and total milk yield for 90 days (liters) were measured. The data were analyzed using descriptive analysis and a t-test: two-sample assuming unequal variances. Results indicated that there was an increase of 14.166% in milk. This significant ( $P < 0.05$ ) increase in milk production indicates a positive impact of UMMB on the performance of buffalo. Economic metrics like the benefit-cost (B:C) ratio, net returns, and gross returns were significantly greater in the treatment group. Hence, the findings in the present study indicate beneficial effects of UMMB on production traits of buffalo in the Indo-Gangetic Plain of Uttar Pradesh.

**Keywords:** B:C ratio, buffalo, milk yield, UMMB

**Introduction**

Buffaloes (*Bubalus bubalis*) have an enormous significance in agriculture by virtue of their high production potential as a triple-purpose animal that provides milk, meat, and mechanical power to manhood (Sidikki *et al.*, 2015) [15]. In our country, buffaloes are primarily fed on cereal straws, which are highly lignified and have low levels of fermented protein and carbs. Buffaloes' poor performance, like low growth rates, low milk yields, and poor reproductive performance (Qureshi *et al.*, 2002; Sahoo *et al.*, 2004; Wynn *et al.*, 2009) [12, 13, 25], is mostly due to imbalanced feeding and erratic and insufficient access to high-quality feed. Supplementing with nutrients that can enhance the utilization of low-quality roughages as well as treat nutrient deficiencies is crucial for increasing buffalo productivity because it can boost feed utilization by adding essential nutrients to the ration (Sampath *et al.*, 1995) [14]. Thus, supplementation of fermentable carbohydrate, protein, and minerals is required for the enhancement of fiber digestion and microbial protein synthesis in the rumen of buffalo. Among the numerous nutritive feed supplements, urea molasses mineral block (UMMB) may enhance the absorption of low-quality roughages because it satisfies the requirements of the rumen microorganisms and improves the conditions for the fermentation of fibrous material, which in turn increases the production of microbial protein and volatile fatty acids (Wongnen, 2007) [24]. Urea molasses mineral block (UMMB), one of the crucial nutritional supplements, may enhance the absorption of low-quality roughages because it fulfills the requirements of the rumen microorganisms and improves the conditions for the fermentation of fibrous material, which in turn increases the production of microbial protein and volatile fatty acids. Lestari *et al.* (2016) [5] said that UMMB may give ruminants vitamins, minerals, non-protein nitrogen, energy, and other nutrients. UMMB had an optimistic influence on body weight improvement, feed consumption, and the blood biochemical parameters of bulls (Liu *et al.*, 2001) [7], crossbred dairy cows (Misra *et al.*, 2006) [10], fattening cattle (Li *et al.*,

2014)<sup>[6]</sup>, Mecheri lambs (Muralidharan *et al.*, 2015) 2014)<sup>[11]</sup>, and working bullocks (Kerketta *et al.*, 2017)<sup>[3]</sup>. Therefore, the aim of this experiment is to envisage the effect of urea molasses mineral block (UMMB) supplementation on milk production and composition of buffalo (*Bubalus bubalis*).

### Materials and Methods

The present study was conducted at Krishi Vigyan Kendra, Palti Khera, Raibareli, C.S.A. University of Agriculture & Technology, Kanpur (U.P.), India, located on a Indo-Gangetic Plain at 26.141475° North Longitude and 80.808193° East Latitude. The climate is subtropical in nature, with temperatures ranging between 3 °C in winter and 48 °C in summer, respectively. The area receives an annual rainfall of 1,025.00 mm.

### Experimental animals and data recording-

This experiment was carried out on buffaloes in two different years (2024-25 & 2025-26) as a front-line demonstration to assess the effect of urea molasses mineral block (UMMB) supplementation on milk production in buffaloes in Krishi Vigyan Kendra, Palti Khera, Raibareli, C.S.A. University of Agriculture & Technology, Kanpur (U.P.). The physical composition of the urea molasses mineral block was presented in table 1. Twenty buffaloes similar in lactation stage, milk yield, and parity were selected for this experiment under similar feeding and management practices. They were selected from each farmer and split equally into two groups (10 buffalo/group): control (T<sub>1</sub>—no supplementation of urea molasses mineral block) and treatment (T<sub>2</sub>—supplement of urea molasses mineral block). Data on production and composition traits, viz., average daily milk yield (liters/day) and total milk yield for 90 days (liters) were collected and utilized for this study.

### Statistical analysis-

The data were analyzed statistically as per Snedecor and Cochran (1989)<sup>[18]</sup>, and student's t-test of significance (two-sample assuming unequal variances) between groups was performed using SPSS for Windows (version 17.0, Microsoft).

### Result and Discussion

The least square means for average daily milk yield (liters/day) and total milk yield for 90 days (liters) were presented in table 2. From the results presented in Table 2, a significant difference ( $P < 0.05$ ) was found in the mean values of daily milk production and total milk yield for 90 days in the year 2024-25, whereas no significant difference was observed in the year 2025-26. Similarly, the result revealed that the overall average daily milk production of buffaloes was significantly higher in the treatment group

(9.549 ± 1.31 liters/day) than in the control group (8.329 ± 1.27 liters/day). Similarly, total milk yield for 90 days (liters) was also found to be higher in the treatment group (859.41 ± 118.26) as compared to the control group (755.505 ± 120.73). It clearly indicated that average per day milk yield was increased 1.2 liters (14.66%).

In agreement with previous findings that UMMB supplementation increased nutrient intakes of Rathi cattle (Bohra *et al.*, 2012)<sup>[2]</sup>, crossbred Holstein lactating cows (Tekeba *et al.*, 2013)<sup>[20]</sup>, and working bullocks (Kerketta *et al.*, 2017)<sup>[3]</sup> fed roughage-based diets, the UMMB supplementation increased the intake of basal diet and improved nutrient digestibility in this study. These findings are consistent with those of Makkar (2001)<sup>[8]</sup>, who claimed that UMMB feeding might increase milk production by 14% each lactation. According to Upreti *et al.* (2010)<sup>[21]</sup>, each animal's average daily milk production rose by 17.7%, or 1.1 liters. However, Mandal *et al.* (2001)<sup>[9]</sup> found that the UMMB supplementation group had a higher increase in milk yield (49.76%), Singh and Singh (2003)<sup>[16]</sup> found that UMMB supplementation increased buffaloes' milk yield by 35.97%, and Avila (2006)<sup>[1]</sup> found that UMMB licking by the lactating buffaloes had a significant impact on milk yield of 21.0%. Wanapat *et al.* (1999)<sup>[23]</sup> and Wadhawa and Bakshi (2011)<sup>[22]</sup> also found similar results, showing that UMMB supplementation increased the intake of basal diet and improved nutrient digestibility, which is important for boosting the milk production of buffaloes, increasing nutrient intakes of Rathi cattle (Bohra *et al.*, 2012)<sup>[2]</sup>, crossbred Holstein lactating cows (Tekeba *et al.*, 2013)<sup>[20]</sup>, and working bullocks (Kerketta *et al.*, 2017)<sup>[3]</sup> raised in pasture-based environments. Suharyono *et al.* (2014) also stated that UMMB supplementation enhanced the microbial protein synthesis in the rumen of buffaloes, beef cattle, and Etawa dairy goats. Additionally, UMMB supplementation enhanced the digestion of cellulolytic fiber and feed consumption by increasing the numbers of cellulolytic bacteria (Singh *et al.*, 2013)<sup>[17]</sup> and protozoa (Lair-Fullringer *et al.*, 2016) in the buffalo calves' rumen.

### Economic parameters

Economic analysis of supplementation of UMMB is depicted in table 3. It was observed that as intake of UMMB boosted overall milk yield by 14.45% in the treatment group. These findings are analogous to those of Mandal *et al.* (2001)<sup>[9]</sup>, who reported that there was a positive correlation between gradually increasing UMMB intake and the level of milk yield. The overall licking UMMB cost an average of Rs. 8.5 to 9.0 per day, and extra income from the sale of extra milk was Rs.54 (1.2\*45/liters) per day per buffalo. Overall benefit-cost ratio (BC) was found to be 1.2 under study. However, Sudhakar *et al.* (2002) reported a higher BC ratio (6.44) than the present study.

**Table 1:** Physical Composition of Urea Molasses Mineral Block

| S. No. | Ingredients Percentage | (%) |
|--------|------------------------|-----|
| 1      | Molasses               | 40  |
| 2      | Urea                   | 10  |
| 3      | Cement                 | 5   |
| 4      | Lime                   | 5   |
| 5      | Deoiled rice bran      | 20  |
| 6      | Wheat bran             | 10  |
| 7      | Mineral mixture        | 8   |
| 8      | Common salt            | 2   |

**Table 2:** Least square means for Milk yield (2024-25 & 2025-26)

| Milk yield parameter               | 2024-25         |                 | 2025-26        |                 | Average         |                |
|------------------------------------|-----------------|-----------------|----------------|-----------------|-----------------|----------------|
|                                    | T <sub>1</sub>  | T <sub>2</sub>  | T <sub>1</sub> | T <sub>2</sub>  | T <sub>1</sub>  | T <sub>2</sub> |
| Average daily milk yield (lit/day) | 7.05ab ± 0.50   | 8.23ba ± 0.60   | 9.60 ± 0.9     | 10.86 ± 1.11    | 8.32 ± 1.27     | 9.54 ± 1.31    |
| Total milk yield for 90 days (lit) | 634.77ab ± 45.4 | 741.15ba ± 54.5 | 876.24 ± 81.3  | 977.67 ± 100.10 | 755.505 ± 120.7 | 859.41 ± 118.2 |

Means with different letter (a, b) indicates significant difference ( $P < 0.05$ ).

**Table 3:** Economics of mineral mixture supplementing in dairy cows (2024-25 & 2025-26)

| Parameters                                                  | 2024-25        |                | 2025-26        |                | Average        |                |
|-------------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                                             | T <sub>1</sub> | T <sub>2</sub> | T <sub>1</sub> | T <sub>2</sub> | T <sub>1</sub> | T <sub>2</sub> |
| Average Cost of Cultivation (Rs.)                           | 13525          | 15855          | 9125           | 15234          | 11325          | 15545          |
| Average Gross Return (Rs.)                                  | 17940          | 21888          | 12180          | 26460          | 15060          | 24174          |
| Net profit by UMMB supplementation (Rs.)                    | 4415           | 5033           | 3055           | 11226          | 3735           | 8629           |
| B:C Ratio                                                   | 1.33           | 1.38           | 1.33           | 1.73           |                |                |
| Extra milk yield (lit./day)                                 | -              | 1.18           | -              | 1.26           | -              | 1.2            |
| Milk Yield increases over controle(%)                       | -              | 16             | -              | 14             | -              | 14.45          |
| Extra income from the sale of milk/day/buffalo @ Rs.45/lit. | -              | 53.1           | -              | 56.7           | -              | 54             |
| Cost of UMMB intake                                         | -              | 8.0            | -              | 10             | -              | 9.0            |

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### Conflict of Interest

Authors declare that they do not have any conflict of interest.

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