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Effects of supplementation of urea-molasses multinutrient block (UMMB) on the performance of dairy cows

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Abstract
Traditional feeding system like feeding of green fodder available in pasture land as well as on private land and mainly Rice Straw & Wheat Straw feeding as a dry fodder throughout the year to milking animal causes low productivity, anoestrus and repeat breeding in animals. One of the methods of increasing utilization of straws is the supplementation of deficient nutrients in licking form so, that fermentable N, energy and minerals, available ensuring enhanced microbial growth in the rumen, which in turn enables the ruminants to consume more straw. But Urea mineral molasses licking block (UMMB) is not popular due to unavailability and addition of cementing materials. Therefore, an on farm trial of 60 days excluding 15 days preliminary periods and 15 days post feeding periods was conducted on 27 animals of 1 month after parturition to know the effect of feeding UMMB block manufactured by locally available feed ingredients and without binding materials on milk production, quality and reproductive performance of dairy animals. Animals feeding as farming practices were considered as control and 300g UMMB licking block in TO1 and in TO2 group 300g UMMB licking block was supplemented reducing concentrate by 20%. The milk yield was 8.16±0.2, 9.10±0.1 and 8.25±0.20 kg respectively which was significantly higher in TO1 than control and TO2 group. Increase in milk yield over control group was 0.640 and 0.190 kg more in TO1 and TO2 group than control group. The average fat% was 3.90±0.10, 4.0±0.12 and 3.80±0.13 in control, TO1 and TO2 group, respectively. It was statistically similar. Net return over feed cost was 10.40 and 4.65 Rs in TO1 and TO2 group, respectively. Decrease in inter calving period was 37 days and increase in conception rate was at first service by 42%. Hence, supplementation of UMMB blocks increase, the milk production, improves Fat% and increases the reproductive performance of dairy animals.

Keywords: dairy cows, urea-molasses multinutrient block, supplementation, performance

Introduction
Triclosan (TCS) [5-chloro-2-(2, 4-dichlorophenoxy) phenol], is a typical chemical in pharmaceuticals and personal care products. It has been used as an antimicrobial agent in pharmaceuticals and personal care products such as surgical suture materials or hand soaps, deodorants, detergents, shampoos, toothpastes, antiseptic-creams, plastics, food-stuffs and functional clothing for many years. In recent years there has been a significant increase in consumer products containing TCS [1-3]. Its widespread use has led to the release of TCS into wastewater, sediments and many water sources. Once in the aquatic environment, TCS can undergo a series of transformation reactions to produce, in some cases, more toxic or bio-accumulative compounds, which lead to the form the basis for Indian milk production is the millions of nondescript cows and buffaloes in rural areas, fed mainly on crop residues and agro-industrial by-products. The mainstay of the feeding system in India is fibrous feed, which forms the bulk of ruminant diets. These fibrous feeds are deficient in protein, energy and minerals, with poor palatability and digestibility. Without additional supplements, such feeds cannot support even body maintenance of the animals. One of the methods of increasing utilization of straws is the supplementation of deficient nutrients in the form of fermentable N, energy and minerals, ensuring thereby enhanced microbial growth in the rumen, which in turn enables the ruminants to consume more straw. All the treatments have some drawbacks. Improper use may cause severe economic loss, especially in the case of urea. An excessive amount of urea or faulty treatment of roughages treated with it may harm, or even kill, animals due to ammonia toxicity. The problem of feeding urea to animals has been overcome in India

by the introduction of feed supplementation blocks in the form of urea-molasses mineral block (UMMB) licks developed at the National Dairy Development Board (NDDB), Anand, India. Urea-molasses mineral block (UMMB) licks can improve the utilization of low quality roughages because it satisfies the requirements of the rumen microorganisms and creates a better environment for the fermentation of fibrous material which eventually increases the production of microbial protein and volatile fatty acids (Wongnen, 2007) [14]. Urea, after hydrolyzing into ammonia in the rumen, provides a nitrogen source for the rumen microflora for their microbial protein synthesis. Molasses is a major source of readily fermentable energy, which assists the growth of rumen microorganisms. In addition, it is considered to be a good carrier for urea and a source of micro minerals (Perera *et al*., 2007. [7]; Wongnen, 2007) [14]. It has been reported by Perera *et al.* (2007) [7] that the incorporation of UMMB under field conditions has tremendously improved the animal performance which may be associated with the "supplementary" and "catalytic" effects of UMMB promoting an optimal ammonia level for efficient microbial activity in the rumen (Kunju, 1986) [7]. Therefore, the objective of this study was to evaluate the effect of UMMB supplementation on the performance of local cows and their 50 % Holstein Friesian crossbred in two different livestock production systems.

Material and Methods

The field trial was undertaken at farmer's dairy farm of Banka, Bihar to know the effect of feeding UMMB block manufactured by locally available feed ingredients and without binding materials on milk production, quality and reproductive performance of dairy animals. Twenty seven cross bred cows in their early to MID lactation stage (lactation number 2 to 7) and having an average daily two week pre trial milk yield of groups (nine animals in each group) in such a way that the order of lactation and average milk yield of three groups were more or less similar. The present experiment was conducted by using Randomized Block Design (RBD) with three treatments, animals feeding as farming practices were considered as control and 300g UMMB licking block in TO1 and in TO2 group 300g UMMB licking block was supplemented reducing concentrate by 20%. The cows were providing UMMB licking block at time of morning and evening milking.

Recording of observations

Cows were milked twice daily at 6:00am and 6:00 pm by hand milking and the milk yields were recorded separately. Milk production was recorded daily after morning and evening milking by farmers. Milk sample for fat analysis were collected fortnightly from morning and evening milking throughout the experimental period. Fat content of milk was determined by milko tester in milk cooperative society. The data generated during the experiment were subjected to one way analysis of variance as per the methods of Robinson and garrett (1999 [10].

Results and Discussion

The ingredient composition of UMMB block used in this study is shown in Table 1. It was previously recommended that 100 g of urea per kilogram of block was sufficient to maintain an optimum rumen ammonia levels for efficient microbial activity (Perera *et al.*, 2007) [7]. In addition, Perera and Perera (2000) [8] explained that the level of external urea intake depended on the nitrogen content of the diet. For instance, 10% of urea was sufficient for UMMB blocks when the animals were fed on medium quality forages with 10–12% crude protein (Dona *et al.*, 2013) [3]. Level of 1 kg of starch per 100 g of urea is often suggested by Beeson (1969) [2]. Hence, the ingredient composition of UMMB block used in this study was comparable to the above recommendations (Table 1). The effects of dietary supplementation of UMMB on the production performances of dairy cows are shown in Table 2. The daily milk yields, FCM yield and Fat yield were significantly ($p<0.05$) higher in T1 than control and T2 group. The fat yield was lowest in T2 group. While, Milk Fat% was comparable of all three group animals (Table 2). Hence, replacement of 20% concentrate did not affect the milk yield and Fat%. Wongnen *et al*. (2006.) [16] Reported that UMMB (0.620-0.680 kg) could replace about 25% of the concentrate supplement. Study conducted by Weerasinghe *et al*. (2010) [10] to evaluate the effects of supplementation of nitrogen through UMMB on the performance of dairy cows fed good quality forage based diets, highlighted that UMMB supplementation significantly ($p<0.05$) increased the milk yield and the yields of milk fat. Further, it was stated that Sahiwal crossbred cows and Nilli-Ravi buffaloes gave 12% and 11% more milk daily, respectively when their diets were supplemented with UMMB (Perera *et al.*, 1997). [9]; Perera and Perera, 2000) [8]. Uthayathas *et al*. (1998) [12] and Sivayoganathan *et al*. (2001) [11] reported that milk quality of Sahiwal and cross-bred cattle was improved due to higher milk fat content when the basal diets were supplemented with UMMB, respectively. As suggested by Weerasinghe *et al*. (2010) [13] in the previous study, the numerically higher improvements in production performances of dairy cows fed treatment diet in this study might be associated with the improved digestibility of the basal diet supplemented with UMMB and the optimum rumen environment maintained thereby (Perera and Perera, 2000). Numerical increases in all the milk production parameters indicated that if basal diet was deficient in major nutrients, part of it can be fulfilled through UMMB supplementation. These low responses in low yielding (5-6l/d) dairy cows could be due to comparatively lower nutrient demand due to smaller body size and lower milk yield, which may have been satisfied by the basal diet (Perera and Perera, 2000) [8].

Net return over feed cost was 10.40 and 4.65 Rs/day/animal in TO1 and TO2 group, respectively. Wongnen *et al*. (2006.) [15] Reported that only 10% of the increase in milk production was due to UMMB supplementation it appears that UMMB feeding is cost effective and beneficial to the dairy industry.

The post partum-estrus (days) significantly ($p<0.05$) reduced in T1 and T2 than control. It may be due to supplementation of minerals and nutrients through UMMB block. AI required/conception was also numerically decreased in T2 and T1 group than control. Decrease in inter calving period was 37 days and increase in conception rate was at first service by 42%. Similarly, Hendratno, 1999 [4] and Miah *et al.*, 2000 [6] reported increased in milk production and reduction of reproductive interval in cross bred cattle after supplementation of UMMB block. Wongnen *et al.* (2006.) [15] Supplementation with UMMB (0.620-0.680 kg) to dairy cattle resulted in a significant decline in services per conception ($P<0.01$), from 2.54 to 1.88, and reduced the mean calving to conception interval (days open) from 127.2 ± 11.3 days to 92.4± 6.6 days. This decline in services per conception reduced the mean calving to conception interval (days open) by 34.8 days. The UMMB supplement also reduced the

calving to first service interval by 11.6 days and the inter-calving interval by 40.3 days.

Table 1: Ingredient composition (%) of UMMB blocks and concentrate fed to dairy cows.

Ingredient UMMB blocks	Concentration (%)
Molasses	40
Urea	10
Wheat bran	15
Rice polish	15
Horse gram	5
Mineral mixture	10
Salt	5
Total	100

Table 2: Performance of dairy cows fed control diet and diets supplemented with UMMB.

Item	Control	T1	T2	SEM
Milk yield (Kg) Initial	7.5	7.8	7.4	
Milk yield (l/d)	8.16 [a]	9.09 [b]	8.25 [a]	0.242
Increased milk yield over control (kg)		0.640	0.190	
Milk fat%	3.94	4.04	3.80	0.159
Fat yield (g/d)	0.322 [ab]	0.367 [b]	0.313 [a]	0.019
FCM yield (l/d)	8.09[a]	9.14 [b]	8.00 [a]	0.361
Gross return (Rs) Over control		22.40	6.65	
Return over feed cost (Rs)		10.40	4.65	
Postpartum estrus (Days)	79.8[b]	56.50[a]	62.40[a]	5.56
No.of AI/conception	2.0	1.60	1.80	0.35

[a,.b] Values with different superscripts in arrow differ ($p<0.05$)

Conclusions

The supplementation of UMMB with the basal diet had significant effect ($p<0.05$) on production performances of dairy cows in this study. As the basal diet consisted of a poor quality roughage source and no sufficient amount of concentrate feed, nutrients provided through UMMB would be required by the animals for their milk production. The numerical increments observed in milk production and quality parameters as the dairy cows were fed diet supplemented with UMMB suggested that creating low nutrient contents in the basal diet through reducing concentrate feed and poor quality roughages could be paid off through the provision of UMMB.

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