Effect of Medicated Block Licks on the Performance of Indigenous Dairy Cows of Bangladesh

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ABSTRACT : For this study three types of block such as medicated urea-molasses-mineral block (MUMMB, 7% urea), urea-molasses-mineral blocks ($UMMB_a$, 7% urea) and urea-molasses-mineral blocks ($UMMB_b$, 21% urea) were prepared. Naturally infested 24 indigenous dairy cows with gastrointestinal nematodes were used to study the effect of MUMMB, $UMMB_a$ and $UMMB_b$ on different parameters (body weight, milk yield, serum urea level, milk urea level). The cows were offered normal diet added with 250 g block per cow for every day. Straw and green grasses were used as basal diet in the ration. The managemental facilities for all cows of each group were similar. Cows were stall fed, calves were tied up at night and had free access to their dam during day time. Milking was done once daily in the morning. The daily average live weight gains by MUMMB, $UMMB_a$ $UMMB_b$, and control group (no block) were 52.08 g, 44.44 g, 48.58 g, and 1.41 g respectively. The live weight gain were statistically significant ($p<0.01$) in comparison to control group. The highest daily milk yield was observed in MUMMB treated cows (2.39 L/d); followed by $UMMB_b$ treated cows (1.82 L/d) and $UMMB_a$ treated cows (2.16 L/d). The lowest milk yield was found in control group (1.54 L/d). This result differs significantly ($p<0.05$) between treated groups and also with control group. During urea-molasses-mineral blocks $UMMB_a$, $UMMB_b$ licking milk urea level increased from initial 22.76±2.35 mg/dl to 35.46±4.80 mg/dl and initial 22.86±2.96 mg/dl to 40.66±0.87 mg/dl respectively. This variation of milk urea level was statistically significant ($p<0.001$). Similarly during $UMMB_a$ and $UMMB_b$ blocks licking, serum urea level increased in both treated groups from initial 22.70±2.60 mg/dl to 32.68±2.21 mg/dl and initial 23.70±2.78 mg/dl to 40.48±3.24 mg/dl, respectively. This variation of serum urea level was also statistically significant ($p<0.001$). Use of MUMMB instead of UMMB was proved better for milk production and live weight gain in dairy cows under the village condition of Bangladesh where balanced ration for dairy cows are a major scarcity. And various concentration of urea in blocks positively affect milk and serum urea levels of indigenous dairy cows. (*Asian-Aus. J. Anim. Sci. 2000. Vol. 13, No. 6 : 774-780*)

Key Words : Medicated Block Lick, UMMB, GI Nematodiasis, Milk Yield, Live Weight, Urea Levels, Dairy Cows

INTRODUCTION

Most of the people of Bangladesh have been suffering from malnutrition because of availability of animal protein shortage. Production of huge amount of milk through our indigenous dairy cattle would supply low cost milk for people and it will relieve them from malnutrition and also will be a great source of employment of our jobless people, land less and marginal farmers will also be benefited by selling milk and milk products. Total average requirement of milk per head is 250 ml per day, but in average we consume only 50 ml per head per day (DLS, 1998). The total production of milk is 1.64 million metric tons which is 19.58% of total requirement (DLS, 1998). This situation indicates the depth of requirement for raising milk production in this country for a healthy nation.

Parasitic infestation and poor nutritional status of our indigenous dairy cattle are the most impediments to livestock production and performance in Bangladesh, as it adversely affects weight gain in growing animals and productivity in adults. Most of the cattle in Bangladesh are non-descriptive type, which do not belong to any specific breed and may be termed as indigenous cattle. They are smaller in size and milk production capability is much lower than that of foreign breeds or cross breeds, but they are generally resistance to diseases, thrive well in hot and humid climate and show better performance in fluctuating nutrient supply. At present, livestock in Bangladesh mainly depends upon low quality roughage and agricultural byproducts which are generally low in nitrogen content. Among all the problems hampering the livestock development, parasitic diseases occupy prime position in Bangladesh. The geo-ecological condition together with water lodged and low lying areas in Bangladesh, poor husbandry methods and shortages of nutrients provide suitable ecological condition for rapid multiplication and dissemination of parasites.

In this present situation to combat these two constraints and raise our milk production by indigenous dairy cattle, the easiest way is to by adopting a practical way to control the gastrointestinal nematode parasitism of cows and simultaneously by improving nutrition. For the control of gastrointestinal nematodiasis, anthelmintics are used sporadically and indiscriminately and still in this country there is no

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report available for sustainable control of gastrointestinal nematodes parasites in cows and simultaneously improved nutrition. In this study attempt have made to prepare medicate-urea-molasses-mineral blocks (MUMMB) for dairy cows. Though urea is fed directly to the cows through blocks or as urea treated straw, determination of milk and serum urea level will be a significant observation. No research work has yet carried out about the efficacy of MUMMB on different parameters in Bangladesh. Considering the all above facts, the present investigation was conducted with the following objectives: (i) To study the effect of MUMMB and UMMB on milk yield of indigenous cows, (ii) To study the effect of MUMMB and UMMB on live weight of indigenous cows, (iii) To know the effect of various concentration of urea on milk urea level of indigenous cows and (iv) To know the effect of various concentration of urea on serum urea level in indigenous cows.

MATERIALS AND METHODS

Selection and management of experimental animals

The research work was carried out in the surrounding villages of Bangladesh Agricultural University, namely Chakchattrapur, Boyra, Sutiakhali and Babukhali and also in the Department of Pharmacology and of Physiology, Faculty of Veterinary Science, BAU, Mymensingh. The experiment was carried out from July 1997 to June 1998 on 24 indigenous lactating cows naturally infested with gastrointestinal nematode parasites. All the selected animals were used only for dairy purposes by the farmers during study period. The animals were 4-6 year old and on an average 121 to 190 kg body weight. During whole of the experimental period the cows were maintained under normal village condition of Bangladesh. Attempts were made to keep all the animals under the same managemental condition. Rice straw was the staple feed for the cows. Green grasses were available depending on the season. The calves were tide up at the night and allowed to free access or suckling to the cows during the whole day. The cows were milked once a day and only in the morning.

Grouping of experimental animals

For the study of the effect of MUMMB, $UMMB_a$ and $UMMB_b$ on milk yield, body weight, serum and milk urea level, a total of 24 post partum dairy cows naturally infested with gastro-intestinal nematode parasites were selected just after calving. All the cows were randomly divided into equal 4 groups namely A, B, C and D each of which contain 6 dairy cows. All the cows of group-A were allowed to lick medicated block (MUMMB), group-B were with $UMMB_a$, group-C with $UMMB_b$ and group-D remain as infested untreated controlled group (No block).

Preparation of blocks

Cold method was used for the preparation of Blocks as described by Mazed (1997). For the present study the composition of MUMMB, and $UMMB_{a,b}$ are given in table 1.

Table 1. Composition of blocks

Ingredients	Amount (%)		
	MUMMB	$UMMB_a$	$UMMB_b$
Molasses	48	48	42
Urea	7	7	21
Wheat bran	29	29	22
Lime (CaO)	6	6	5
Salt	5	5	5
Vitamin & mineral mixture (Calfostonic^R)	5	5	5
Fenbendazole (g/kg)	0.4	-	-

The size and weight of each block was $21 \times 16 \times 7$ cm and 1.50 kg respectively. MUMMB was allowed to lick by the experimental dairy cows of group A once or twice in a day at the dose rate of 250 g/d for each animal. $UMMB_a$ for the animals of group B and $UMMB_b$ for group C. Block was placed in a wooden box for proper licking. The daily intake of fenbendazole of each cow of group A was 100 mg to achieve the dose rate of 0.5 mg/kg BW. All the cows of both control and treated group had free access to normal feed and clean drinking water.

Collection and examination of samples

Blood and milk samples were collected and examined from all cows of each group prior to block licking i.e. day 0 and during block licking at the day 30, 60, 90. About 5 ml of blood collected without anticoagulant from the external Jugular vein of each experimental cow. The serum was prepared from blood as described by Sakumer (1997). About 5-6 ml of whole milk collected from four quarters during morning milking of each experimental cow in a test tube. Both milk and blood serum samples were analyzed by Refrotron^R analyzer (mannheim, boehringer, Germany) for urea level within 24 hrs of collection as described by MacKay et al. (1927).

Initial body weight of each cow was taken at the beginning of the experiment. The body weight was taken in morning before feeding and was recorded. Therefore, the body weight were taken once a month till the end of experiment during block licking i.e. on day 60, 90, 120, 150. Weighing balance of BAU dairy farm were used for measurement of live weight of individual experimental animal. To know the effect of MUMMB and UMMB on milk yield, daily milk yield

Table 2. Effects of MUMMB and UMMB on live weight of indigenous dairy cow

Group (No. of cow)	Type of block licking	Live weight (kg) before block licking (Mean±SD)	Live weight (kg) during block licking (Mean ± SD)				Average live weight gain (g/d)	Live weight gain percentage	Level of significance
		30th day	60th day	90th day	120th day	150th day			
A (n=6)	MUMMB	148.00±24.44	149.41±24.34	151.33±24.60	153.58±24.72	154.25±24.31	52.08[a]	4.22	**
B (n=6)	$UMMB_a$	159.50±28.31	160.41±28.06	162.16±28.89	163.75±28.17	164.83±28.37	44.44[b]	3.34	**
C (n=6)	$UMMB_b$	141.00±20.15	142.41±20.21	144.41±19.88	145.91±20.40	146.83±20.48	48.58[a]	4.13	**
D (n=6)	No block (Control)	139.83±12.12	139.75±13.56	140.33±13.56	140.62±13.28	140.00±12.64	1.41[c]	0.12	

Mean value in column with different superscripts differ significantly.
** =Significant at 1% levels of probability ($p<0.01$).

Table 3. Effects of MUMMB and UMMB on milk yield of indigenous dairy cow

Group (No. of cow)	Type of block licking	Milk yield (L/d) before block licking (Mean±SD)	Milk yield (L/d) during block licking (Mean±SD)				Average milk yield (L/d) during block licking (Mean ± SD)	Increased %	Level of significance
		1st month	2nd month	3rd month	4th month	5th month			
A (n=6)	MUMMB	1.500±0.52	1.917±0.61	2.208±0.58	2.458±0.60	2.583±0.61	2.396[a]±0.63	55.48	*
B (n=6)	$UMMB^a$	1.417±0.52	1.625±0.47	1.750±0.50	1.917±0.54	2.00±0.39	1.821[b]±0.46	18.17	*
C (n=6)	$UMMB^b$	1.458±0.37	1.750±0.42	1.958±0.43	2.417±0.47	2.458±0.43	2.167[a]±0.40	40.62	*
D (n=6)	No block (Control)	1.500±0.61	1.750±0.61	1.792±0.66	1.417±0.68	1.208±0.64	1.541[c]±0.63	-	NS

Mean value in column with different superscript differs significantly.
* =Significant at 5% levels of probability ($p<0.05$); NS=Non significant ($p>0.05$).

was recorded.

Statistical analysis

Statistical analysis of the experimental data was carried out according to Steel and Torrie (1980) to analysis of variance in Completely Randomized Design (CRD). The results were assayed in "MSTAT" computer programme.

RESULTS

Effects of MUMMB and UMMB on live weight in indigenous dairy cows

The initial average live weight of dairy cows before block licking in group-A was 148.00±24.44 kg, group-B was 159.50±28.31 kg and group-C was 141.00±20.15 kg which were offered to lick MUMMB, $UMMB_a$ and $UMMB_b$ respectively. The live weight of all cows in all treated groups were increased significantly ($p<0.05$) when compared with initial live weight value and also significant ($p<0.01$) when compared with control group. At 150th day of experiment average live weight of all treated groups were increased and was 154.25±24.31 kg in group-A, 164.83±28.37 kg in group-B, 146.83±20.48 kg in group-C. Whereas in control group-D average live weight of all cows were increased slightly on 150th day of experiment from initial 139.83±12.12 kg to 140.00±12.69 kg. These results are shown in table 2. The daily average live weight gains by MUMMB, $UMMB_a$, $MUMMB_b$ and no block (control group) groups were 52.08 g, 44.44 g, 48.58 g and 1.41 g respectively. The highest live weight gain was found in MUMMB treated group (4.22%); followed by $UMMB_b$ treated group (4.13%) and $UMMB_a$ treated group (0.12%). The lowest live weight gain was observed in control group (no block).

Effects of MUMMB and UMMB on milk yield in indigenous dairy cows

The daily average milk yield in experimental cows is presented in table 3. The daily average milk yield during block licking i.e. during the whole experimental period in group-A (treated with MUMMB) was 2.396±0.63 L/d, group-B (treated with $UMMB_a$) was 1.821±0.46 L/d and group-C (treated with $UMMB_b$) was 2.167±0.40 L/d. Whereas in control group-D (no block) was 1.541±0.63 L/d. The average daily milk

Table 4. Effects of $UMMB_{a,b}$ (a=7%, b=21% concentration of urea) on milk urea level of indigenous dairy cow

Group (No. of cow)	Type of block licking	Milk urea level (mg/dl) before block licking		Milk urea level (mg/dl) during block licking						Level of signifi-cance
		0 day		30th day		60th day		90th day		
		Range (mg/dl)	Mean±SD	Range (mg/dl)	Mean±SD	Range (mg/dl)	Mean±SD	Range (mg/dl)	Mean±SD	
B (n=5)	$UMMB_a$	<20.00 to 25.90	22.76^{c} ±2.35	31.20 to 40.00	32.52^{b}±3.01	28.80 to 41.20	32.38^{b}±2.91	29.50 to 41.90	35.46^{a}±4.80	**
C (n=5)	$UMMB_b$	<20.00 to 27.00	22.86^{c} ±2.96	37.20 to 40.9	38.52^{b}±1.29	38.90 to 42.00	39.40^{a}±1.91	39.20 to 41.2	40.66^{a}±0.87	**
D (n=5)	No block (Control)	<20.00 to 25.00	22.56^{a} ±2.39	20.80 to 25.90	23.34^{a}±1.84	<20.00 to 24.80	22.46^{a}±2.20	<20.00 to 26.00	22.78^{a}±2.25	NS

Mean value in row with different superscripts differ significantly.
**=Significant at 1% levels of probability (p<0.001); NS=Non significant (p>0.05).

Table 5. Effects of $UMMB_{a,b}$ (a=7%, b=21% concentration of urea) on serum urea level of indigenous dairy cow

Group (No. of cow)	Type of block licking	Serum urea level (mg/dl) before block licking		Serum urea level (mg/dl) during block licking						Level of signifi-cance
		0 day		30th day		60th day		90th day		
		Range (mg/dl)	Mean±SD	Range (mg/dl)	Mean±SD	Range (mg/dl)	Mean±SD	Range (mg/dl)	Mean±SD	
B (n=5)	$UMMB_a$	<20.00 to 25.80	22.70^{b}±2.60	28.90 to 36.9	32.52^{a}±3.01	28.20 to 35.80	32.38^{a}±2.90	28.80 to 36.00	32.68^{a}±2.81	**
C (n=5)	$UMMB_b$	<20.00 to 27.50	23.70^{c}±2.78	36.60 to 39.80	38.52^{b}±1.28	37.20 to 41.20	39.40^{a}±1.90	37.20 to 45.30	40.48^{a}±3.24	**
D (n=5)	No block (Control)	<20.00 to 28.8	25.020^{a}±3.54	21.00 to 29.0	25.06^{a}±3.25	21.80 to 29.20	25.38^{a}±3.18	<20.00 to 29.50	25.00^{a}±4.02	NS

Mean value in row with different superscripts differ significantly.
** =Significant at 1% levels of probability (p<0.001).
NS = Non significant (p>0.05).

yield of all treated groups increased significantly (p<0.05) when compared with control group. The highest daily milk yield was found in MUMMB treated cows (55.48%), followed by $UMMB_b$ treated cows (40.62%) and the lowest was found in $UMMB_a$ treated cows (18.17%).

Effect of UMMB (two-types of urea level) on milk urea level

Before block licking average milk urea level of all cows of group-B (treated with $UMMB_a$, 7% urea), group-C (treated with $UMMB_b$, 21% urea) and group-D (no block) were 22.76±2.35 mg/dl, 22.86± 2.96 mg/dl and 22.56±2.39 mg/dl respectively. On 30th day during block licking milk urea level was increased significantly in both treated groups (p<0.001) when compared with that of initial value and the increased milk urea level of group-B and C were 32.52±3.01 mg/dl and 38.52±1.29 mg/dl. The more or less similar milk urea level was found on 60th day during block licking. On 90th day during block licking group-B shown 35.46±4.80 mg/dl and group-C shown 40.66±0.87 mg/dl milk urea level. The milk urea level of control group was more or less similar during the whole experimental period, which was statistically nonsignificant (p>0.05). These results are shown in table 4. The highest milk urea level was found in $UMMB_b$ treated cows followed by $UMMB_a$ treated cows.

Effect of UMMB (two-types of urea level) on serum urea level

Before offering block licking average serum urea level of all cows group-B (treated with $UMMB_a$, 7%

urea), group-C (treated with $UMMB_b$, 21% urea) and group-D (no block) were 22.70±2.60 mg/dl, 23.70± 2.78 mg/dl and 25.02±3.54 mg/dl respectively. On 30th day of block licking serum urea levels were increased significantly in both treated groups ($p<0.001$) when compared with that of initial value. The increased serum urea level of group-B and C were 32.52±3.01 mg/dl and 38.52±1.28 mg/dl. The more or less similar serum urea level was still remained significantly higher ($p<0.01$) on 60th and 90th day during block licking in comparison to initial value. On 90th day during block licking group-B shown 32.68±2.81 mg/dl and group-C shown 40.48±3.24 mg/dl serum urea level. The serum urea level was more or less similar in controlled group during the whole experimental period, which was statistically nonsignificant ($p>0.05$). These results are shown in table 5. The highest serum urea level was found in $UMMB_b$ treated cows followed by $UMMB_a$ treated cows.

DISCUSSION

The daily average increased live weight of MUMMB, $UMMB_a$, $UMMB_b$ and control group treated group were 52.08 g/d, 44.44 g/d, 48.58 g/d and 1.41 g/d respectively. This live weight gain of cows of treated and control group was statistically significant ($p>0.01$) and also when compared with initial live weight ($p<0.05$). These results are with an agreement with the earlier findings of Sanyal and Singh (1995a), Huq et al. (1996), Su et al. (1984), Kunju (1986a). Several workers observed better body weight gain in different types of cattle by feeding urea molasses supplement ration (Ghosh et al., 1993; Hashem et al., 1994; Saddullah et al., 1994; Hendratno et al., 1991; Rafiq et al., 1996). This present results were lower than that was reported by Alderete et al. (1995), this variation was due to variation of the species, breed and age of animals, variation of composition of blocks. Highest live weight gain occurred in medicated block licking group due to lack of parasitic burden. There are several reports that anthelmintic treatment have positive effect on body weight. Ahmed (1992) reported that 2399 cattle of different age groups gained on an average 6.9 kg body weight during 4 months of anthelmintic treatment. Within block treated groups the lowest live weight was found in $UMMB_a$ treated group and $UMMB_b$ treated was the intermediate.

The daily average milk yield during the whole experimental period for MUMMB treated group was 2.396±0.63 L/d, $UMMB_a$ treated group was 1.821± 0.46 L/d , $UMMB_b$ treated group was 2.167±0.40 L/d and for control group (no block) was 1.541±0.63 L/d. The daily average milk yield of all treated groups are statistically significant ($p<0.05$) when compared with that of control group. This result is in close conformity with the earlier report of Sanyal et al. (1995), Saadullah et al. (1989). The similar effect of urea-molasses-block on milk yield was described by Hendratno et al. (1991), Ahmed et al. (1982), Kunju (1986b). This result is lower than that was reported by Sanyal et al. (1995), Kunju (1986a), due to variation of species, breed of animals, composition of blocks and managemental factors. Average daily milk yield was highest in medicated blocks licking group due to lack of parasitic load, supply of improved nutrition which resulted highest daily milk yield. Economic benefit of parasite control has been illustrate by good many authors in different parts of world. Todd (1974) showed that 1000 lactating cows when de-wormed produced 1 kg more milk per day starting at 8 days after treatment. It is a fact that the actual milk yields of our indigenous cows are higher than that mentioned above, because we only measured the overnight milk production. The calves were accessed free sucking to their mother in the daytime. So, the day milk sucked by calves under the existing management system in our country.

The average milk urea level of cows subjected to $UMMB_a$ (7% concentration of urea) was 35.46±4.80 mg/dl and those subjected to $UMMB_b$ (21% concentration of urea) was 40.66±0.87 mg/dl, whereas in control group (no block) was 22.78±2.25 mg/dl. Milk urea level in treated groups were increased significantly ($p<0.001$) in comparison to pre-treatment value. This result was also agreed with by the result of Ahamed (1992), Bakanov et al. (1976), Mpelimpasakes (Belibasakis) (1981). This result of milk urea analysis was found higher than the previous finding of Kharanov and Bulatova (1979), due to breed of animals, and technique of sample analysis. These results of milk urea were lower than the previous report of Bhavadasan et al. (1982) may be due to period of administration, frequency of administration and concentration of urea in blocks. Highest urea level was found in $UMMB_b$ treated group due to more concentration of urea in block and lowest in control group and intermediate for $UMMB_a$ group, due to less urea concentration in block. Normal milk urea level was 16.14-23.32 mg/dl (Ahamed, 1992; Bhavadasan et al., 1982). The administration of this blocks (MUMMB, $UMMB_a$ and $UMMB_b$) having different concentration of urea (7%, 21%) positively increased milk urea level and this increased urea level was higher than the normal range of milk urea level. No adverse effect was found on experimental animal.

The average serum urea level of cows when offered $UMMB_a$ (7% concentration of urea), $UMMB_b$ (21% concentration of urea) and no block (control group) were 32.68±2.81 mg/dl, 40.48±3.24 mg/dl and

25.00±4.02 mg/dl respectively. Serum urea level in treated groups increased significantly ($p<0.01$) in comparison to pre-treatment value. Highest serum urea level was found in $UMMB_b$ (21%) treated group due to more urea concentration in block. Due to lack of earlier report these results were not compared. Reinartz and Hofmann (1989) reported that serum urea levels were significantly influenced by lactational stage. So, from above discussion it can be said that urea-molasses-block licking has positive effect on serum urea level and it depends upon on urea concentration of feed. Any adverse effect was not found on experimental animal.

From this trial it was evident that medicated blocks (MUMMB) could be suitable for control of gastrointestinal nematode, increased milk production and improve nutritional status of animal. From this study it assumed that 21% concentration of urea in block increased both milk and serum urea level and this increased milk urea level was higher than the normal range. But 7% urea in block, milk urea level was increased slightly than the normal range. So, it may be concluded that use of MUMMB instead of UMMB was proved better for milk production and live weight gain in dairy cows under the village condition of Bangladesh where balanced ration for diary cows are a major scarcity.

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