International Journal of Agriculture Innovations and Research
Volume 5, Issue 6, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received: 21/04/2017 | Accepted on : 28/04/2017 | Published : 05/05/2017

Effect of Urea Molasses Mineral Block as Feed Supplement on Body Weight Gain and Haemato-biochemical Parameters of Working Bullocks

Neelmani Kerketta*, V.M. Victor, A.K. Chandraker and S.V. Jogdand
All India Co-ordinated Research Project on Utilization of Animal Energy.
Faculty of Agricultural Engineering Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.).
*Corresponding author email id: neelmani.kerketta@yahoo.com

Abstract **– A study was carried out with working bullocks maintained under smallholder mixed farming system to assess the effect of urea molasses mineral block (UMMB) supplementation on body weight, feed intake and haemato biochemical parameters. Six pairs of working bullocks of almost similar body weight and age were selected randomly and divided into two groups (Group-I and Group- II) having 3 pairs each. The bullocks of Group- I (Control group) were fed only basal diet containing 1 kg concentrate mixture, 10 kg of natural grasses and *ad lib*. paddy straw. The bullocks of Group- II were supplemented with 500 g of UMMB in addition to basal diet. The period of experimental feeding was 90 days. After the end of experimental feeding it was observed that average increase in body weight gain (31.17±0.76 kg) of UMMB supplemented group was significantly higher (P<0.01) than non supplemented group (13.00±2.79). Similarly, average straw intake (7.71 ±0.06 kg/day) was also significantly higher (P<0.01) in UMMB supplemented group than non supplemented group (6.58±0.01 kg/day). The studies on haemato biochemical parameters revealed significant increase (P<0.01)in Haemoglobin, Total Erythrocyte Count, Total Leukocyte Count, Total Serum Protein, Albumin, Globulin, Blood Urea Nitrogen and Blood Glucose content of UMMB supplemented bullocks when compared to non supplemented bullocks. In the opinion of the participating farmers supplementation of UMMB improved straw consumption, general health and work performance of the bullocks. The experiment concluded that supplementation of UMMB to bullocks fed on straw based diet is an effective strategy to enhance their draught capacity.**

Keywords **– Working Bullocks, Weight Gain, Haematobiochemical Parameters, Urea Molasses Mineral Block Licks (UMMB).**

I. INTRODUCTION

In India, like most of the developing countries crop residues form the bulk of ruminants diet. These crop residues are deficient in protein, energy and minerals and cannot support even body maintenance of the animal. The poor nutritive value of rice straw and the very limited amounts of supplementary feeds reflects very low animal productivity. Traditionally in villages of Chhattisgarh state, bullocks are reared mainly on a rice straw-based diet and the practice of supplementation is not common. Straws are poor livestock feed, and rice straw is no exception. The average availability of cereal and pulse milling offal and oilcakes per head of cattle or buffalo in the rice-growing areas of India is only about 0.1 kg per day. Straws contain only 3 to 5 percent crude protein. Animals on an un supplemented straw diet will usually not gain any weight and very often will actually lose weight. To obtain any production the straw must be supplemented, preferably with nitrogen/ protein and energy. One of the method of increasing utilization of straw is the supplementation of deficient nutrients in the form of fermentable nitrogen, energy and minerals, through urea, molasses and mineral mixture, respectively. Spraying of these ingredients on the straw could not become popular due to risk of urea toxicity and problem of handling and storage of molasses under field condition. In India, this problem has been overcome by the introduction of urea molasses mineral block (UMMB) licks. Urea is a nitrogen-based product secreted from the kidneys is created by the breakdown of proteins and may be utilized by rumen microbial populations to synthesize protein. Molasses, a major by product of the sugar industry is a good, palatable and cheap source of energy for ruminants and used as a carrier for urea and mineral supplements and as supplementary feed for ruminants, providing the slow, continuous intake of nutrients needed to optimize fermentative digestion in the rumen (Bach *et al*.2005). The traditional feeding system is insufficient to meet their nutritional requirement and this reflects on bullocks especially during working season. Urea molasses mineral blocks (UMMB) provide a readily available source of energy in the form of molasses, nitrogen (from protein and non-protein sources), fiber and minerals. The major advantage of using the block is convenience in terms of packaging, storage, transport and ease of feeding. Therefore, the present experiment was undertaken to study the effect of feeding UMMB on body weight gain, feed intake and haemato biochemical parameters of working bullocks.

II. MATERIALS AND METHODS

The proposed study was carried out in village Borid, Arang block of Raipur district in Chhattisgarh. The experiment was done for a period of 90 days with six pairs of working bullocks to study the effect of UMMB supplementation on different parameters (body weight gain, feed intake, and haemato biochemical parameters). The animals were divided into two groups each having six animals. The feed ingredients used in formulating basal diet for each groups of animals were paddy straw, mixed green grasses and concentrate mixture. One group of animals fed with only basal diet was designated as control

(group I) and another group (group II) was supplemented with urea molasses mineral block (UMMB) along with basal diet.

Ingredient Composition of UMMB

The ingredient composition of UMMB was molasses, wheat bran, cotton seed cake, urea, cement, lime stone powder, mineral mixture and common salt at the level of 40, 28, 8, 10, 5, 5, 2 and 2 %, respectively.

Preparation of UMMB Licks

Firstly exact amount of molasses was taken in a dish and mixed with powdered urea and half amount of salt thoroughly. After that mineral mixture was added. In another dish cement, limestone powder and rest half amount of salt were mixed with small amount of water to make thick paste. This mixture was added in dish containing molasses mixture and mixed properly. Then in this mixture crushed cotton seed was added followed by wheat bran. Whole ingredients were mixed properly to make thick consistency. Then this mixture was placed in frame of size 9x 3x 3inch made up of aluminum sheet and compressed with wooden weight of suitable size to make more compact blocks. Then frame was removed leaving UMMB block on the polythene sheet. The blocks were left in room temperature to air dry. After one day the blocks are left outside room for drying but not in direct sunlight. After solidification the blocks were ready for distribution.

Feeding and Management of Animals

The entire 12 bullock were kept under stall fed condition. The straw diet was offered to all animals on *ad libitum* basis. All the animals were fed I kg of concentrate mixture daily in the morning. The animal was also offered 10 kg of mixed green grasses available on roadsides and on the bunds of cultivated fields. The UMMB weighing 500 grams was placed in evening time in container for experimental bullocks (group II) to lick. The bullocks of both control and experimental groups had free access to clean and fresh water. The overall management practices for all the bullocks were similar under the supervision of us.

Collection and Analysis

The feed samples were analysed for proximate constituents (AOAC, 1999), The analysis of calcium and phosphorus was also done (Talapatra *et al.*,1940). The blood samples were collected from each bullock by puncturing jugular vein and stored in sterile vacutainers on ice with and without EDTA. 2 ml of blood sample was kept for haematological examination and 8 ml of blood was kept for serum collection. The examination of haematological parameters parameters viz. haemoglobin, total erythrocytic count (TEC) and total leukocyte count (TLC) of experimental bullocks was done determined by using "CELL COUNTER" an instrument for complete blood count (CBC) of 'VECTOR' company. The collected serum samples were analysed for biochemical parameters viz. Total serum protein (g/dL), Serum albumin (g/dL), Serum globulin (g/dL), Blood Urea Nitrogen (mg/dL), Serum glucose (mg/dL), Serum calcium ((mg/dL) and Serum phosphorus (mg/dL) in Semi - Auto Analyzer, Merck make using standard biochemical kits.

Record Keeping

The body weights of each bullock of both groups was taken at the beginning of the experiment and at the end of 90 days of experimental feeding on the electronic weighing bridge Daily intake of roughages and concentrates were also recorded. Haemato biochemical parameters were determined before the start and after the end of experimental feeding.

Statistical Analysis

The recorded data was by applying independent 't' test as per method suggested by Snedecor and Cochran (1994).

III. Results And Discussion

The chemical composition of different feeds offered to experimental bullocks is given in Table: 1.The changes in body weight of bullocks and paddy straw intake of both.

Table 1. Chemical composition of feed and fodders (% DM basis)

Attributes	Paddy straw	Mixed green grass	Concentrate mixture	UMMB
Dry Matter %	95.1	30	92.3	91.4
Crude Protein %	3.8	7.25	17	33.5
Crude Fibre %	34	30	14	4.44
Ether Extract%	0.64	0.9	3.06	2.21
Nitrogen Free Extract %	47.26	50.92	49.68	51.15
Total Ash%	14.3	9.8	12.43	5.94
Calcium (%)	0.64	1.3	2.7	1.8
Phosphorus (%)	0.24	0.2	0.5	0.27

UMMB non supplemented (control) and supplemented group (treatment) are presented in table. 2. There were non significant differences in initial and final body weights of bullocks of both groups. But the mean body weight gain was significantly ($P<0.01$) higher in treatment group than control group during the experimental feeding period of 90 days (Table 2). The finding was in agreement with Misra *et al.*(2006), who reported significantly higher body weight gain ($P<0.05$) in crossbred cows supplemented with UMMB than un-supplemented animals. Similar findings were observed by Akter *et al.* (2004) in calves and cows. Zhang *et al.* (1998) reported average daily gain of 486.7±73.2 g in the experiment group and 346.8 g in the control group during the UMMB feeding period, increased by 40.3% ($P<0.01$) in cattle. Haili *et al.* (2014) observed the average daily gain of 0.92±0.23g in *ad lib.* UMMB supplemented and 0.64±0.14g in non supplemented fattening cattle during 90 days of feeding. The mean daily weight gain of UMMB supplemented group was significantly ($P<0.01$) higher than non supplemented group in the present investigation. The comparatively lower daily weight gain in present finings might be due to lower intake of UMMB in compare to other investigations.

International Journal of Agriculture Innovations and Research
Volume 5, Issue 6, ISSN (Online) 2319-1473

Table 2. Body weight change and feed intake of bullocks of control and UMMB supplemented group

Attributes	Group I (Control)	Group II (UMMB supplemented)
Initial body weight (kg)	329.17± 8.21	328.67±4.94
Final body weight(kg)	342.17±8.98	359.83±4.52
Body weight gain/loss (kg)	13.00±2.79**	31.17±0.76**
Daily weight gain (g)	144.44±33.95**	346.30±9.26**
Initial straw intake(kg/day)	3.68±0.03	3.79±0.06
Final straw intake (kg/day)	6.58±0.01**	7.71±0.06**
Increase in straw intake (kg)	2.89± 0.04**	3.92 ± 0.07**
Total DM intake (kg/animal/d)	10.174±0.02**	11.716±0.06**

** P<0.01 Significant difference

Initially the intake of paddy straw differed non significantly in both groups but significant (P<0.01) increase was observed in UMMB supplemented group. In UMMB supplemented group an increase in straw intake might be due to supplementation of adequate nitrogen, energy and minerals, which accelerated rumen fermentation which was reflected in the fermentation of higher amount of straw and resulted in higher amount of straw consumption. The report of Misra *et al*. (2006) also suggested that supplementation of UMMB improved straw consumption and general health of the animals under smallholder mixed farming system. The total dry matter intake per animal per day was found significantly (P<0.01) higher in UMMB supplemented group than the group which has no access to UMMB. Toppo *et al.* 1997 also observed dry matter intake in UMMB supplemented group.

The observed effects of UMMB supplementation on haematological and biochemical parameters are presented in table-3. The results showed significantly higher haemoglobin, total erythrocyte count (P<0.01) and total leukocyte count (P<0.05) content in UMMB supplemented group than control group. The results of biochemical analysis of serum samples (Table 3) revealed significant increase in albumin, blood urea nitrogen, glucose level (P<0.01) and total serum protein, globulin (P<0.05) level of UMMB supplemented group. The findings were in agreement with the investigation of Hailii *et al.* (2014) who reported significant increase in haemoglobin, total serum protein, albumin and globulin contents of fattening cattle who received *ad libitum* UMMB supplementation for 90 days. Significantly (P<0.01) higher level of blood urea nitrogen in UMMB supplemented group in present investigation was in agreement with Choubey *et al*. (2015) who also reported that the blood urea nitrogen level was higher (P<0.05) in animals offered UMMB supplemented diets as compared to conventional control group. Pambu-Gollah *et al.* (2000) also suggested that blood urea concentrations are positively related to the crude protein intake when diets containing sufficient energy are provided.

Table 3. Haematological and biochemical parameters of bullocks of UMMB non supplemented and supplemented groups

Parameters	Early experiment		At the end of experiment	
	GroupI (Control)	Group II (UMMB supplemented)	GroupI (Control)	Group II (UMMB supplemented)
Hematological parameters				
Haemoglobin (gm%)	10.2±0.39	10.22±0.25	10.93±0.32**	12.6±0.24**
Total Erythrocyte Count (10^{12}/L)	5.83±0.15	5.78±0.19	6.14±0.19**	6.82±0.17**
Total Leukocyte Count (10^{9}/L)	8.27±0.72	8.53±0.49	9.1±0.72**	11.09±0.51**
Biochemical parameters				
Total serum protein (g/dL)	8.42±0.26	8.26±0.37	9.65±0.41*	10.71±0.17*
Serum albumin (g/dL)	3.24±0.13	3.22±0.08	3.70±0.18**	4.22±0.04**
Serum globulin (g/dL)	4.51±0.31	5.01±0.46	5.74±0.33*	6.89±0.39*
Blood Urea Nitrogen (mg/ dL)	23.07±0.67	21.61±0.73	28.79±0.63**	38.80±0.27**
Serum glucose (mg/ dL)	38.07±0.85	37.85±0.70	46.82±1.37**	63.23±0.79**
Serum calcium ((mg/ dL)	9.83±0.10	9.39±0.09	10.77±0.40	11.2±0.28
Serum phosphorus (mg/dL)	4.55±0.35	4.59±0.43	5.83±0.60	6.5±0.48

*P<0.05 significant difference
** P<0.01 Significant difference

Blood urea nitrogen levels indicate the adequacy or inadequacy of nitrogen in diet (Jindal *et al.,* 1988). It is clear from the experiment that nitrogen content of the diet was adequate for both groups and as the nitrogen intake by animals of the UMMB fed groups were higher, plasma urea nitrogen level were higher in that particular group. The increase in blood urea nitrogen level was within the normal range indicating that UMMB supplementation has not any harmful effect on liver. Although, blood urea nitrogen was higher in treatment groups, but no symptoms of urea toxicity was observed during the entire study period and all animals were found to be active and in good health effect. The blood glucose level increased in both groups but was significantly (P<0.01) higher in UMMB supplemented group when compared with non supplemented group. This might be due to supplementation of non- protein nitrogen and energy in the form of urea and molasses in UMMB. It was thought that the effects of the non-protein nitrogen and energy on the fermentation in the rumen may improve the production of the fatty acids in the rumen and would subsequently influence blood glucose metabolism. Initially the glucose level was slightly lower than normal range in both groups indicating the feeding of low protein diet. However, blood glucose level was slightly higher than the normal range

without any adverse effect. The result of the present experiment revealed that serum calcium and phosphorus levels increased in both UMMB supplemented and non supplemented groups but difference was not significant. Denek *et al.* (2006) also mentioned that the serum calcium can be affected by different factors like weather, stress and the animal body's response to the environment as well as its nutritional condition. However, Haili *et al.* (2014) observed significant increase in calcium and phosphorus level in fattening cattle fed with *ad libitum* UMMB in an experimental period of 90 days.

IV. Conclusion

According to the results it can be concluded that supplementation of urea molasses mineral block at rate of 500 g/animal/day above the rice straw based diet with some amount of concentrate mixture had positive effect on the body weight gain, normal health and working ability of bullocks. Making UMMB is a simple technology, it could be recommended to farmers to supplement their bullocks as an effective strategy to improve the performance of bullocks.

Acknowledgments

Sincere thanks are due to AICRP on Utilization of Animal Energy for funding to conduct the research. Authors are also thankful to Animal Nutrition Laboratory, College of Veterinary Science, Anjora, Durg, State Veterinary Department, CG, Government, Department of Farm Machinery Power Engineering, Faculty of Agricultural Engineering, Indira Gandhi Krishi Vishwavidyalaya, Raipur for providing necessary facilities to complete this research.

References

[1] Yeasmin Akter. M.A. Akbar. M. Shahjalal and I.U. Ahmed. "Effect of Urea Molasses Multi–nutrient Blocks Supplementa--tion of Dairy Cows Fed Rice Straw and Green Grasses on Milk Yield, Composition, Live Weight Gain of Cows and Calves and Feed Intake" *Pakistan J. Biological Sciences*. vol. 7(9).2004. pp. 1523- 1525.

[2] AOAC. "Official method of analysis". 16 th ed., Association of Official Analytical Chemist. Washington, DC. 1999.

[3] A. Bach. S. Calsamigha and M. D. Stern. "Nitrogen metabolism in the rumen." J. Dairy Sci. vol. 88.Supplement.May.2005. pp. E9- E21.

[4] M. Choubey. M. Wadhwa and M. P. S. Bakshi. "Evaluation of urea molasses multi-nutrient blocks containing alternate feed resources in buffaloes". *Buffalo bulletin*. vol. 34(1). March 2015. pp. 5-16.

[5] N.A. Denek. S. Can. K.Tufenk, H. Ipek Yazqa. and M. Iriadam. "The effect of heat load on nutrient utilization and blood parameters of Awassi ram lambs fed different types and levels of forages." *Small Rumin. Res*." Vol.63 (1-2).May. 2006. pp 156-161.

[6] Haili Li. Zihua Hou. Qi Yang. Qinfan Li. Keling Wang. Limin Lang. Ping Lin. Jianlin Li and Jianhua Wang. Study the effect of urea molasses multinutrient block on fattening cattle. Journal of Food, Agriculture & Environment. Vol.12 (2). 2014. pp. 573 - 578.

[7] S. K. Jindal. R.C. Jakhmola. D.N. Kamra. Rameshwar Singh and S.C. Gupta. "Blood urea concentration in sheep as affected by buffalo dung wastelage feeding." *Internl. J. Anim. Sci.* Vol. 3(1).1988. pp 51-55.

[8] A. K. Misra. G. Subba Reddy and Y. S. Ramakrishna. "Participatory on-farm evaluation of urea molasses mineral block as a supplement to crossbred cows for dry season feeding in rain-fed agro-ecosystem of India." *Livestock Research for Rural Development.*Vol.18..Article #24. 2006. Retrieved Jan.11, 2017 from http://www.lrrd.org/lrrd18/2/misr18024.htm

[9] R. Pambu-Gollah. P.B. Cronje and N.H. Casey. "An evaluation of the use of blood metabolite concentrations as indicators of nutritional status in free ranging indigenous goats in South Africa." *J. Anim. Sci.* Vol. 30(2). 2000. pp. 115-120. [10]R. Singh. S. Kumar and P. S. Brar. "Evaluation of urea molasses multi-nutrient blocks enriched with area specific mineral mixture in buffaloes." *The Indian J. Animal Sciences*. Vol 80 (6). 2010. pp. 561- 564.

[11] G.W. Snedecor and W.G.Cochran.. *Statistical Methods*. 1994. 8thEdn. Iowa State University Press. Ames, Iowa, USA.

[12] S.K. Talapatra. S. C. Ray and K.C. Sen. "The analysis of mineral constituents in biological materials." Part I. Estimation of phosphorus, chlorine, calcium, magnesium, sodium, potassium in feed stuffs. *Indian J. of Veterinary Science.* Vol.10. 1940. pp. 243- 258.

[13] S. Toppo. A.K. Verma. R.S. Dass and U.R. Mehra. "Nutrient utilization and rumen fermentation pattern in crossbred cattle fed different planes of nutrition supplemented with urea molasses mineral block." *Anim. Feed Sci. Tech.* vol. 64(2-4).1997. pp. 101-112.

[14] B. Zhang. Z. S. Pu and C. Y. Liu. "UMMB impact on weight gain rate and economic benefit." *Journal of Grass and Livestock.* vol. 2. 1998. pp. 21-22.