ON FARM EVALUATION OF UREA MOLASSESED STRAW (UMS) FEEDING TO LACTATING COWS

M. Islam[1] and K. S. Huque

Bangladesh Livestock Research Institute, Savar, Dhaka 1341, Bangladesh

Summary

Two on farm feeding trials were conducted at the Pabna milkshed area during July to October 1993, to evaluate the response of feeding urea molassesed straw (UMS) on milk production of Pabna milking cows and its economics. A feeding trial of 60 days with 50 Pabna milking cows showed that the cows fed UMS as a replacer of dry straw increased daily milk yield by 1.37 litre. Moreover, it reduced the daily requirement of concentrate by 1.0 kg/head. In the second trial, a herd of 52 animals including 14 milking cows were fed UMS in place of traditionally used dry straw. Introduction of UMS increased the milk production by 1.0 litre/cow/day and saved concentrate by 1.5 kg/cow daily. Urea molassesed straw can safely and economically be fed to lactating cows.

(**Key Words**: Urea Molassesed Straw, Cows, Milk Production and Cost)

Introduction

The cattle production in Pabna, a traditional milkshed area of Bangladesh (Hermans et al., 1989, Udo et al., 1990) is closely related to seasonal flood. Udo et al. (1992) stated that there are two distinct feeding systems in the area; one is based on green forages (bathan forages) from October to May (dry season) at Bathan and the other is stall feeding in June to September (wet season). They stated that in the latter system intake of dry matter only slightly above the maintenance level. This was mainly due to the inclusion of dry straw in the diet and often supplemented with concentrate without any access to grazing land or green grasses. Attempts had been made to improve straw by treating with urea and/or supplementing with concentrates (Dolberg, 1981; Saadullah, 1986). However, straw treatment with urea has not yet been accepted by the farmer of Pabna milkshed area (PMSA). The farmer stated that the process is cumbersome, and expensive and related with storage problems (Huque et al., 1994). A feeding trial conducted at the Bangladesh Livestock Research Institute (BLRI), showed that bulls fed urea molassesed straw (UMS mixed at a ratio of 03:15:82) gained live weight at a faster rate (982 g/day) than the animals fed straw and urea only. The mixing method of straw is very simple. The present on farm trial of cattle has thus been undertaken to evaluate the UMS in term of its response to milk production and its acceptance by farmers.

Materials and Methods

Two experiments were conducted at farmers' house in Pabna milkshed area (PMSA) during July to October, 1993. Fifty (50) Pabna milking cows (PMC) [originated from crossing deshi with Shahiwal or Haryana or Red Sindhi bull, Ghosh, 1982] were selected for trial 1. The cows were in the 1st to 3rd lactation and were divided into two groups. A group of twenty five cows was fed urea molassessed straw (UMS) *ad lib.*, while the other was given dry straw (without treated with urea or molasses). Both the groups were supplied with a restricted amount of concentrate mixture, the composition of which is shown in table 1. The daily allowances of concentrate were reduced by 1.0 kg/head/d in UMS fed cows. As UMS is supposed to maintain the optimum ammonia nitrogen level in the rumen (Huque and chowdhury, 1994), the above amount of concentrate mixture was replaced from the dry straw (untreated) diet formulated according to ARC (1980) feeding standard. Milk production of the cows recorded for a period of 15 days before the start of the experiment, 60 days during the trial

[1]Address reprint requests to Dr. M. Islam, Bangladesh Livestock Research Institute, Savar, Dhaka 1341, Bangladesh.

Received January 28, 1995
Accepted May 30, 1995

period and lastly for a period of 30 days at the end of the trial. In trial 2, comparison of feed cost of a herd consisting 14 milking cows with their calves, yearling cattle and bullocks were studied in two different months after replacing traditionally fed dry straw. Data of total feed cost of the herd and total milk production (liter/day) were recorded.

Preparation of urea molassesed straw (UMS)

The weighed amounts of urea, molasses and straw were mixed at a ratio of 3:15:82 (Huque and Talukder, 1994). The urea and molasses were made solution with water (50-60% of straw DM) and mixed with straw. Although, storing of the processed urea molassesed straw was not essential but farmers used to prepare it at their convenient time and often stored it for 24 hours in mangers or on the concrete floor or in concrete tanks. It was usually depended on the facilities available to the farmers.

Feeding Cows

Dry straw or the UMS were fed *ad libitum*. The amount of concentrate mixture (table 1) prepared and supplied by Milk-Vita (Bangladesh Milk Producers Co-operative Union Ltd.) to the primary milk producers was kept constant to the group of animals of trial 1. The straws were fed in bamboo made mangers and the daily amount of concentrate mixture was supplied in two equal halves in the morning and in the evening before milking times. The animals had a free access to fresh water. The animals were dewormed before starting the experiment.

TABLE 1. FEEDS AND CONCENTRATE MIXTURE USED IN THE EXPERIMENT

Item	Diets	
	Treatment	Control
Dry straw (Aman) fresh	–	*Ad. libitum*
Straw (Processed with 3% urea and 15% molasses)	*Ad. libitum*	–
Concentrate mixture (kg/cow/day)	4.50 kg	5.50 kg
Composition of the mixture (g/kg)		
Wheat bran	300	300
Kheshari (*Lathyrus sativus*) bran	70	70
Coconut oil cake	310	310
Rice polish	220	220
Til (Sesame) oil cake	90	90
Common salt	10	10

Dry matter, ash and crude protein of feed samples were analyzed according to the method described by AOAC (1980), while the acid detergent fibre (ADF) was determined according to the method described by Georing and Van Soest (1970). Data on milk yields of the two groups of cows were analyzed to determine the significant difference in treatment response according to the paired t-test (Steel and Torrie, 1980).

Results and Discussion

Chemical composition of feeds

Chemical composition of the feed ingredients is presented in table 2. The crude protein content of the processed straw (5.90%) was higher than dry straw (3.1%) and acid detergent fibre (ADF) was (61.7%) lower than that of the dry straw (78.1%). The urea molassesed straw contains 90% more CP than dry straw and 21% less ADF. This was possibly due to the replacement of dry straw by urea and molasses. Dry straw absorbed urea molasses solution and increased its water content.

TABLE 2. CHEMICAL COMPOSITION OF THE FEED INGREDIENTS

Ingredients	DM	% On DM basis			
	%	ASH	OM	CP	ADF
Dry straw	91.3	17.3	82.7	3.12	78.1
Urea molassessed straw (UMS)	47.2	16.0	84.0	5.90	61.7
Concentrate mixture	91.5	10.75	89.3	16.9	52.2

Milk production

The daily milk yields (liters/cow/day) of the cows fed UMS and dry straw are shown in table 3. The milk production of the cows fed UMS was significantly higher ($p < 0.01$) than those fed dry straw during the experimental period. This may have resulted in due to the feeding of urea and molasses as an intimate mix with straw which helped in creating a better rumen environment in terms of the supply of ammonia nitrogen and soluble carbohydrate to rumen microbes. The continuous supply of nitrogen and soluble energy possibly increased microbial protein yield in the lower gut. Saadullah (1986) stated that 2% nitrogen and 10-15% molasses supported the maximum protein synthesis in the rumen. Mixing of dry straw with urea molasses solution possibly made it soft and helped animals to eat more straw. Huque and Chowdhury (1994) found that the mixing of urea and molasses with straw significantly

increased its intake by bulls and triplied the microbial protein yield in the rumen. The higher intake of straw may had a positive effect on the rumen dilution factor which might also help in increasing microbial protein yield in the lower gut. Preston (1974) stated that molasses could increase the palatability of a low quality roughage diet. Ahmed et al. (1982) and Khan and Davis, (1980) found a higher milk yield of the cows fed urea treated straw by replacing fresh straw in the diet. Clark and Barries (1954) reported that the cattle were benefitted from a urea molasses solution when fed with a poor quality diet.

TABLE 3. COMPARATIVE MILK YIELD (L /DAY /COW) OF COWS FED UMS AND DRY STRAW (MEAN ± SD, n = 24)

	UMS	Dry straw	Differences	Significance level
Pre experimental period (15 days)	7.92 ± 1.93	8.07 ± 1.77	0.15 ± 0.49	NS
Experimental period (60 days)	9.29 ± 2.25	8.35 ± 2.13	0.94 ± 0.51	$p < 0.01$
Post experimental period (30 days)	8.80 ± 2.27	7.85 ± 2.23	0.95 ± 0.34	$p < 0.01$
Differences[1] (L/cow)	1.37 ± 0.65	0.58 ± 0.64		$p < 0.01$
Differences[2] (L/cow)	0.49 ± 0.31	0.50 ± 0.39		NS

[1] Difference between experiment and pre-experiment period.
[2] Difference between experiment and post-experiment period.

A different method of supplementing urea and molasses to straw is licking of urea molasses blocks by animals which also gives positive effects on milk production (Preston and Leng, 1987). The UMB feeding to animal was costly, cumbersome and often associated with its acceptability to the farmers (Huque, 1994). Huque and chowdhury (1994) found that the feeding of straw as UMS gave a significantly ($p < 0.05$) higher live weight gains of growing bulls than supplementation of straw with UMBs. Moreover, UMB storage is often associated with fungal infestation, specially in the wet season. Thus, the UMS system of feeding urea and molasses was selected and found effective for increasing milk production at farmers level.

A simple economic analysis of milk production of the two diets fed to the animals of trial 2 is presented in table 4. Similar responses of UMS feeding on milk yield and on the reduction of daily allowances of concentrate were also found in the trial. Feeding of UMS increased daily milk yield by 1.0 l/day and reduced concentrate allowances by 1.5 kg/day cow. From the table, it may be found that the feeding of UMS diet reduced the feed cost of $ 2.0 per day and at the same time increased milk production by 13.89 liter/day from a herd of 14 cows. As the other costs were constant for the two groups of animals, feeding of UMS as a replacer of dry straw gave a net profit of taka 321.00/day in place of taka 86.00/day in the dry straw diet. The profit was calculated from the higher milk yields and the amount of concentrates reduced daily in the UMS group.

TABLE 4. HERD SIZE AND ITS FEED COST AND PROFITABILITY ANALYSIS OF THE HERD

Parameter	UMS (November 1-30)	Dry straw (October 1-30)
Herd size		
Milking cows	14	14
Dry cows	3	3
Calves	14	14
Yearling cattle	15	16
Bull and bullocks	6	4
Total	52	51
Diets (daily)		
Fresh straw (kg)	90	80
Urea (kg)	2.7	–
Molasses (kg)	12.05	–
Concentrate mixture (kg)*	105	140
Total feed cost (Tk.)	663.00	745.0
Milk production (Total/L/day)	96.78	82.89
Milk production/cow (L/day)	6.91	5.91
Income from milk (Tk/day)	1,064.00	911.00
Gross profit (Tk/day)	401.00	166.00
Laborer (TK.)	80.00	80.00
Net profit (TK.)	321.00	86.00

*Price considered, straw, 1.00; urea, 5.00; molasses, 5.50; concentrate mixture 5.50 milk, 11.00 and laborer 40.00/day. 1 US $ = 40.00.

Farmers comments

In the experimental period farmers have been asked about the feasibility of urea molassesed straw through a standard questionnaire. The views expressed by the farmers on the feeding of urea molassesed straw as a replacer of dry straw are listed below:

- Urea molassesed straw feeding increased the feed intake, milk production and live weight gains.
- Cattle prefer UMS more than dry straw.
- Straw can easily be processed without chopping.
- Labor cost is too low than the treatment of straw with urea (urea mixing with straw and ensiling for 7 to 14 days).
- Only a man in an hour can easily process the daily straw needed to feed.
- They could process straw according to their daily requirements.
- UMS reduced the daily allowances of concentrate.

Conclusion

From the study it may be concluded that, the feeding of straw intimately mixed with urea (3%) and molasses (15%) increased daily milk yields and reduced feed cost. Farmers accepted the technique easily because of its simple methods of processing and feeding. It may also be concluded that there is a wide scope of extending the technique of feeding urea molassesed straw to cattle among the farmers.

Acknowledgements

The authors pleased to acknowledge Dr. Nazir Ahmed, Director, Bangladesh Livestock Research Institute, Mr. P. R. Chakma, Additional Director (Admn.) and Dr. M. Mafizul Islam, Head, System Research Division for providing necessary facilities for the work. They also acknowledge to those who gave information during the experiment.

Literature Cited

ARC, 1980. Nutrient Requirements of Ruminant Animals. Commonwealth Agriculture Bureau. Slaugh, England.

Association of Official Agricultural Chemists (AOAC). 1980. 9th edn. Washington, DC. p. 379.

Ahmed, T. U., A. K. M. A. Mannan, M. S. Rahman and M. Haque. 1982. Study of urea treated rice straw in milk production. Bangladesh Journal of Animal Science. Vol. 11 (1 and 2).

Clark, R. and N. Barrie. 1954. Winter feeding Experiments. Fing S. Afr. 29:135-138.

Dolberg, F. 1981. Progress in the utilization on urea-ammonia treated crop residues. Biological and socio-economic aspects of animal production and application of the technology on small farms. Livestock Research for Rural Development. Vol. 4. No. 2. 1992.

Georing, H. K. and P. J. Van Soest. 1970. Forage fibre analysis (Apparatus, reagent, procedure and some application). US Dept. of Agric. Hand Book No. 379, Superintendent of Dowment, US Govt of Printing Office, Washington DC. 2042.

Ghosh, J. C. 1982. The history of milking cows of the bathan areas of pabna district In. Maximum Livestock from minimum land. (Ed. M. G. Jackson) Proceedings of a seiner at Bangladesh Agricultural University, Mymensingh, pp. 201-205.

Huque, K. S. and S. A. Chowdhury. 1994. Study on the feeding systems of urea and molasses as supplements to straw. A Research Report. Animal Production Research Division. Bangladesh Livestock Research Institute. Savar, Dhaka-1341.

Huque, K. S. and M. A. I. Talukder. 1994. Effect of molasses supplementation of a roughage based diet on growth performances of cattle. Accepted for publication in the Asian-Australasian Journal of Animal Sciences.

Huque, K. S., M. A. Jalil, M. R. Islam, M. A. I. Talukder and M. Islam. 1994. Transfer of technology Assessment: Comparison of urea feeding systems of promote livestock production. Accepted for publication in Bangladesh Journal of Livestock Research.

Hermans, C., H. M. J. Udo and F. Dawood. 1989. Cattle production under village condition in Pabna, Bangladesh: a data analysis. SAW-W-87-05 Wageningen.

Khan, A. K. M. N. and C. H. Davis. 1980. Effect of treating paddy straw with ammonia on the performance of Bangladesh local and graded Lactating cow: Paper presented at workshop on Livestock ADAB, Faridpur, December 17-19.

Preston, T. R. 1974. Sugarcane as the basis of intensive animal production. Proceeding of conference on animal feed of tropical and subtropical region. Held at London School of Pharmacy (Edt. Halliday.) London WCIN 1 AX. 1-5. April.

Preston, T. R. and R. A. Leng. 1987. Matching ruminant production systems with available resources in the tropics and sub-tropics, Armidale, Australia, Penambul Books.

Saadullah, M. 1986. Effect of urea molasses with untreated and 4% NaOH treated rice straw on utilization of urea-N rumen microorganism and NH_3-N concentration in the ruminal fluid *in vitro*. Bangladesh. Veterinary Journal 20. 3-4. 47-53.

Steel, R. G. D. and O. J. H. Torrie. 1980. Principles and Procedures of Statistics Mc-Graw Hill Book Company Inc. New York.

Udo, H. M. J., C. Hermans and F. Dawood. 1990. Comparison of two cattle production system in Pabna district, Bangladesh. Tropical Animal Health and Production. 22:247-259.

Udo, H. M. J., C. Harmonies and F. Dawood. 1992. Seasonality in Cattle feed sources in Pabna, Bangladesh. Tropical Animal Health and Production. 24:50-56.