PERFORMANCE OF LAMBS FED UREA MOLASSES BLOCKS vs CONCENTRATE

I. H. Mirza, J. K. Jadoon,[a] M. A. Naqvi[b] and A. Ali

National Agricultural Research Center, Islamabad, Pakistan

Summary

Thirty five crossbred male lambs of about 8 months age, with an average body weight of 24 kg were divided into 7 groups of 5 lambs each and were fed urea molasses blocks (UMB) for 150 days (groups 1 to 5); having 4, 6, 8 and 10% urea respectively; while group 6 was fed concentrate @318 g per head daily and 7th group was kept as control i.e. grazing only. Daily consumption of UMB/concentrate was found to be 318, 246, 211, 200, 93 and 318 g/d for groups 1 to 6, respectively. The statistical differences in consumption between group 1 and group 6, and group 2, 3 and 4 were found to be non-significant. Only group 5 differed statistically from all other groups. The average daily gain was 48, 29, 39, 38, 25 and 66 grams for groups 1 to 6 respectively, while group no. 7 lost 11 g/head/day. The differences in weight gain among groups 1, 3, 4 and 6 were non significant. The expenditure per kg body weight gain was found to be (Rs[c]) 9.53, 12.45, 8.05, 7.99, 3.69 and 10.85 for groups 1 to 6, respectively.

(Key Words: Urea Molasses Blocks, Lambs)

Introduction

In Baluchistan, hilly tracts of NWFP and Northern areas of Pakistan, there is a sever biomass shortage and most of the ranges are poor nutritionally. Hence sheep and goats grazed on such pastures during winter usually lose weight and their productive and reproductive efficiency is reduced. Therefore, supplementation of these undernourished animals with unconventional and cheap sources of energy and proteins becomes essential. About one million tonnes of molasses; which is the cheapest source of energy; is available in Pakistan. Since molasses is deficient in nitrogen, urea being the cheapest source of non-protein-nitrogen (NPN), can effectively complement the molasses. However, there is a need to develop a safe and efficient method of incorporating higher levels of molasses and urea. Urea molasses blocks (UMB) technology seems to be the answer of most of the above mentioned problems. Since there is a controversy among the scientists i.e. Bhattacharya and Pervez (1973); Kropp et al.(1977); Ustinova and Kolesnikova (1980); El-Kapani et al. (1985); Pate et al. (1985) about the level of urea to be used, the present experiment was conducted to investigate the optimum level of urea in blocks, and to compare the performance in terms of consumption, weight gain and economics of blocks versus concentrate.

Materials and Methods

Thirty five Rambouillet x Kaghani male lambs (F_3) of about 8 months age and on an average 24 kilograms bodyweight, were divided into 7 groups of 5 lambs each. Group no. 1 (G-1) to group no. 5 (G-5) were offered block no. 1 (B-1) to block no. 5 (B-5) respectively. Blocks were offered *ad lib*. Group no. 6 (G-6) was offered Vandana (a commerical concentrate) @ 318 g/head daily; while group no. 7 (G-7) was kept on grazing as control. These UMB and concentrate were offered as supplement to poor grazing. All the lambs were grazed together for about 7 hours daily and on return from grazing seperated and confined to their respective pens. Blocks were offered in the galvanized iron tubs. All the concentrate offered was consumed. Blocks were weighed daily while the lambs were weighed weekly. The blocks and concentrate samples were analyzed (AOAC, 1970) monthly. The experiment lasted for 150 days i.e. october to march. The data obtained were analysed using ANOVA and Duncan's Multiple Range Test(DMRT) (Snedecore and Cochran, 1966).

---

[a] Jaba Sheep Research Station, Mansehra, NWFP, Pakistan.

[b] Address reprint requests to Mr. M. A. Naqvi, National Coordinator (Sheep and Wool Project), Animal Sciences Institute, National Agricultural Centre, P.O. NIH, Islamabad, Pakistan.

[c] One US dollar = 17.61 Pakistan rupees.

Received March 16, 1988
Accepted May 25, 1988

TABLE 1. PERCENT COMPOSITION OF UREA-MOLASSES BLOCKS AND CONCENTRATE (%)

	Block No. 1	Block No. 2	Block No. 3	Block No. 4	Block No. 5	Concentrate
Molasses (Sugar beet)	60	60	60	60	50	–
Urea	4	6	8	10	10	–
Calcium Oxide (Powder)	8	8	8	8	5	–
Monosodium Phosphate	4	4	4	4	–	–
Vitamin/Minerals Premix	1	1	1	1	–	–
Wheat bran	23	21	19	17	25	–
Cement	–	–	–	–	5	–
Common Salt	–	–	–	–	5	–
Dry Matter	85.24	85.34	85.45	85.55	87.08	88.03
Crude Protein	13.85	19.26	24.67	30.08	30.98	20.73
Crude Fiber	2.83	2.58	2.53	2.99	3.07	12.55

TABLE 2. BLOCKS/CONCENTRATE CONSUMPTION (KILOGRAMS ±SE)

	G-1	G-2	G-3	G-4	G-5	G 6
Consumption in 150 days.	238.35[a]	184.20[b]	157.95[b]	149.85[b]	69.90[c]	238.8[a]
Daily Consumption/ group.	1.589±0.218	1.228±0.297	1.053±0.161	0.999±0.150	0.466±0.109	1.590±00
Daily Consumption/ head.	0.318	0.246	0.211	0.200	0.093	0.318

INDIVIDUAL DAILY CONSUMPTION OF VARIOUS INGREDIENTS (GRAMS)

	G-1	G-2	G-3	G-4	G-5	G-6
Urea	12.72	14.76	16.88	20.00	9.30	–
Molasses	190.80	147.6	126.60	120.00	46.50	
Monosodium Phosphate	12.72	9.84	8.44	8.00	-	
Calcium Oxide	25.44	19.68	16.88	16.00	4.65	
Wheat Bran	73.14	51.66	40.09	34.00	23.25	–

[a,b,c] Means on the same line that do not have a cummon superscript letter differ ($P < .05$).

Results and Discussion

Blocks/concentrate consumption

Total quantity of blocks/concentrate consumed during the experimental period of 150 days was found to be 238, 184, 158, 150, 70 and 239 kg by groups 1, 2, 3, 4, 5 and 6, respectively. The results indicated that with increasing the level of urea there was a linear decrease in consumption. The analysis of variance (ANOVA) showed a highly significant difference ($P < 0.01$) in consumption among different groups. Duncan's Multiple Range Test (DMRT) showed that consumption in G-6 (concentrate group) was significantly higher than all groups except G-1. Block consumption among group no. 3, 4 and 5 differed significantly ($P < 0.01$) from G-6 while consumption in G-2 was significantly lower ($P < 0.05$) than G-6: G-1 differed in consumption from G-2 ($P < 0.05$) as well as from G-3, G-4 and G-5 ($P < 0.01$). In G-2 the consumption of block was significantly higher

($P < 0.01$) than G-5; however, there was no significant difference in the consumption of blocks among G-2, G-3 and G-4. The difference in consumption of blocks between G-4 and G-5 was highly significant ($P < 0.01$).

Consumption of block no. 5; which had least molasses and no monosodium phosphate, was least and resulted in the least weight gain. Thus the positive contribution of molasses and monosodium phosphate became evident. The results of this study are in line with the findings of Ivan et al. (1976), El-Kapani et al. (1985) and Pate et al. (1985) who found a decline in consumption by increasing the level of urea. The results are also in agreement with White et al. (1973) who found that level of urea can be increased by increasing the intake of energy from sources like molasses. Bhattacharya and Pervez (1973) found that average feed intake and daily weight gain tended to decline when urea replaced soybean meal in lambs ration.

Body weight gain or loss

Average body weight gain was found to be 48, 29, 39, 38, 25 and 66 g/d for G-1, G-2, G-3, G-4, G-5 and G-6, respectively while G-7 lost 11 gram/head/day. Analysis of variance showed a highly significant difference ($P < 0.01$) in body weight gain among different groups. DMR test showed that in weight gain, G-6 did not differ statistically from G-1, G-3 and G-4, but, differed from G-2 and G-5 ($P < 0.05$). G-1 differed from G-2 and G-5 ($P < 0.01$) while its difference was non-significant with other treatment groups. Similarly G-3 and G-4 differed from G-2 and G-5 ($P < 0.01$).

TABLE 3. PERFORMANCE OF LAMBS

	G-1 on B 1	G-2 on B 2	G-3 on B-3	G-4 on B-4	G-5 on B-5	G-6 on concentrate	G-7 (Control)
Av. initial weight/animal (kg ± SE)	23.5±1.28	23.86 ± 1.66	23.96±1.85	23.86±1.40	23.93±1.64	23.98±1.71	23.86±2.15
Av. final weight/animal (kg ± SE)	30.7±1.35	28.21±2.27	29.81±1.65	29.56±1.59	27.68±1.61	33.88±1.82	22.21±2.13
Total weight gain or loss per group (kg)	36.0	21.75	29.25	28.50	18.75	49.50	8.25
Total weight gain or loss per lamb (kg)	7.20	4.35	5.85	5.70	3.75	9.90	−1.65
Av. gain/lamb/day(kg)	0.048[a]	0.029[b]	0.039[a]	0.038[a]	0.025[b]	0.066[a]	−0.011[c]

[a, b, c]Means on the same line that do not have a common superscript letter differ ($P < .05$).

TABLE 4. ECONOMICS (RUPEES)[a]

	G-1	G-2	G-3	G-4	G-5	G-6	G-7
Price/kg. feed	1.44	1.47	1.49	1.52	0.99	2.25	Nil
Total expenditure	343	271	235	228	69	537	Nil
Expenditure/kg Bodyweight gain.	9.53	12.45	8.05	7.99	3.69	10.85	Nil

[a]One U.S. dollar = 17.61 Pakistan Rupees.

The results in group 2 fed on block no. 2 are quite strange probably because of some disease problem with two animals in this group. The results of this study mostly go in favour of blocks over Vandana especially when we consider economics. The results of this study are in agreement with most ofthe scientists; however the results do differ with the results of some scientists.

Woo and Kang (1987) found greatest microbial crude protein synthesis (MCP) in sheep given soybean meal (SBM) as compared with sheep given only rice straw, untreated or ammonia treated. So the improved MCP synthesis will ultimately affect performance positively. Hasan (1979) found that DM digestibility and retention of N were similar in sheep, goats, cattle and buffaloes fed a diet with 67% of total N from urea. So in review of literature we can quote the work done on goats, cattle and buffaloes. Davison et al.(1986) found higher milk production in cows fed higher levels of molasses. Faruque et al. (1986) found that male buffalo calves given daily paddy straw 7, sugarcane leaves 3, wheat bran 1.5 and mustard cake (MC) 0.8 or 1.3 kg molasses plus urea 90 or 135g replacing MC. The diets had no significant different effect on daily weight gain (30, 35 and 34 g respectively). Sharma (1986) gave ewes water without or with urea or urea and molasses (1:5) and found that ewes in supplemented groups produced about 7 kg more milk than did control during 90 days. Lambs of supplemented group were about 9% heavier than control at 13 weeks age. Wool yield was, however, not different. Rios and Riley (1985) found a daily weight gain of 17 and 54g for goats (7 months old) grazing without or with molasses (0.5 kg) supplement, and 28 and 43g for goats grazing without or with soyabean oilmeal (0.15 kg) supplement. White et al. (1973) found that replacing urea with soybean meal or molasses with corn had no significant effect on nutrient digestibility. Pate et al. (1985) found that cows fed molasses were significantly heavier than the non-supplemented ones. Jayal et al. (1982) when fed male Haryana cattle (2 year old) for 6 weeks on oat straw without additive or with molasses 10% or urea 1.5% or both, found that the groups lost 5 kg, maintained bodyweight, gained 1.5 and 3 kg for the diets mentioned in the order above. Bhattacharya and Pervez (1973) found that when urea replaced soybean in lambs diet resulted in decline in weight gain. Handerson (1986) found that sheep fed urea-molasses blocks containing 0, 3 and 6% urea lost 35g, gained 19 and 24 g of bodyweight per day, respectively; but without any change in intake.

On daily weight gain basis, the group fed concentrate excelled all others followed by group no. 1 fed block no.1. The difference between these two groups in consumption and weight gain were not statistically significant. As only the daily liveweight gain was considered then the concentrate group is the best, but if we consider the feed efficiency and economics then we shall have to change the pattern. Since in this experiment we could not record the roughage consumption in different groups, we cannot give some concrete conclusions. If we know the roughage consumption, the feed efficiency and economics may be further different.

If only the amount spent per kilogram bodyweight gain was considered, the group fed block no. 5 will be the best one followed by G-4, G-3, G-1, G-6 and G-2, respectively, but here we must keep in mind that the extra time required in G-5, G-4, etc. to reach the bodyweight equivalent to G-6, G-1 etc. did. We could not shear the experimental animals of different groups; which might have been very much beneficial in evaluating different groups. Results of this study have also indicated clearly that during winter season the supplementation is very much essential and rewarding as well. However, some feedlot type of experiment need to be done in which the roughage intake should also be recorded to come to much reliable conclusions. However, one thing has become very clear in this study that block no. 1 is equivalent to the commercial concentrate (Vandana) in terms of intake and weight gain, and rather better in terms of expenditure per kilogram bodyweight gain. With more research this technology of urea-molasses blocks may be further improved.

Literature Cited

AOAC. 1970. Official Methods of Analysis (11th Ed.). Association of Official Analytical Chemists, Washington, DC., U.S.A.

Bhattacharya, A. N. and E. Pervez. 1973. Effect of urea supplementation on intake and utilization of diets containing low quality roughages in sheep. J. Anim. Sci. 36:976-981.

Davison, T. M., D. H. Isles and K. R. McGuigan. 1986.

The effect of dietary supplementation with molasses and christmas is. Phosphate (CIP) on milk yield of cows grazing tropical pastures. Proceedings of the Australian Society of Animal Production 16:179-182.

El-kapani A. W., F. N. Kiroloss, E. I. Hassanien, A. R. Mohammad and H. Omran. 1985. Vet. Medical J. 13:167-185.

Faruque, M. O., M. A. Hasnath, K. G. Mostafa and M. M. Mian. 1986. Potential replacement of protein by urea-molasses in concentrate mixture fed to buffaloes. Indian J. Anim. Sci. 56:1104-1106

Gonzalez, F. and A. Elias. 1984. The performance of calves fed different urea levels in the concentrate. Cuban J. Agri. Sci. 18:269-275.

Hasan, S. A. 1979. Studies on the utilization of NPN by ruminants. Alexandria J. Agricultural Res. 27(3).

Hendrawan, S. 1986. The use of urea-molasses blocks to provide supplements to sheep and goats. Fibrous Agricultural Residues Newsletter 6:6.

Ivan, G. R., R. R. Johnson and T. Robert. 1976. Evaluation of beef cattle range supplements containing urea and biuret. J. Anim. Sci. 42:1297-1308.

Jayal, M. M., V. K. Jain and N. N. Pathak. 1982. Urea and molasses impregnation of oat straw for evolving maintenance ration for Haryana bulls. Indian J. Nutrition and Dietetics 19:219-224.

Kropp, J. R., R. R. Johnson, J. R. Males and F. N. Owens. 1977. Microbial protein synthesis with low quality roughage ration. Isonitrogenous substitution of urea with soyabean meal. J. Anim. Sci. 45:844-854.

Pate, F. M., F. M. Fairhurst and J. T. K. Munthali. 1985. Urea levels and supplemental energy sources in sugarcane diets. J. Anim. Sci. 61:252-259.

Pate, F. M., J. R. Crockett and J. D. Phillips. 1985 Effect of calf weaning age and cow supplementation on cow productivity. J. Anim. Sci. 61:343-348.

Rios, G. and J. A. Riley, 1985. Preliminary studies on the utilization of the natural vegetation in the henequen zone of Yucatan for the production of goats. 2. The effect of supplementation with protein and or energy. Tropical Anim. Production.10:11 18.

Sharma, K. 1986. Effect of urea and urea-molasses supplementation with drinking water on the production performance of Muzaffarbadi ewes in semi-arid environment. Indian Vet. J. 63:584-588.

Snedecore, G. W. and W. G. Cochran, 1966. Statistical Methods. Iowa State Univ. Press, Ames, Iowa, U.S.A.

Ustinova, M. P. and A. A. Kolesnikova. 1980. Large doses of urea in diets for rearing and fattening young cattle. Zhivotnovodstua, 60:25-27.

White, T. W., W. L. Reynolds and F. G. Hembry. 1973. Influence of urea and molasses on nutrient digestibility of high roughage rations by steers. J. Anim. Sci. 37:1428-1432.

Woo, K. K. and H. S. Kang. 1987. Blood urea-N, ruminal MCP-N concentration and fluid status of the sheep fed ammoniated rice straw with and without formic acid addition by dietary-N sources and levels. Korean J. Diary Sci. 9:8-25.