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SHORT COMMUNICATION

Effect of Urea supplementation on digestibility and intake of sodium hydroxide treated rice straw by Buffalo calves

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The major limiting factor in the extensive use of rice straw as a ruminant feedstuff is its low nutritive value. A variety of methods of straw treatment to increase digestibility and voluntary intake, now exists but chemical treatment with sodium hydroxide (NaOH) has been claimed to be the most effective.[6,10]

The low crude protein content characteristic of rice straw, also renders it less valuable as a feedstuff for ruminants. Non-protein nitrogen (npn) supplementation of roughages increases crude protein equivalent of the roughage, digestibility and voluntary feed consumption [1,3,4] and urea is most probably the commonest npn compound of choice as a protein replacer.[3] Data however is lacking on the usefulness of urea as a nitrogen supplement for alkali treated rice straw in the diet of buffaloes. The present study was therefore conducted to investigate the influence of urea as a protein supplement on the feeding value of alkali treated rice straw by growing buffalo calves.

Rice straw chopped into 100-150 mm lengths was treated with sodium hydroxide solution (43 g NaOH in 1.2 litres water per kg straw dry matter) by spray treatment.[7] Treated straw after 24 hours was dried in an Unitherm oven at 98°C and stored until required for the feeding trial.

Six growing buffalo calves (indigenous breed) of average live weight 95 kg (approximately 1 year old) were used to measure the apparent digestibility of four rations. Three animals were used for each treatment.

Each buffalo calf was offered *ad libitum* treated straw + 1 kg concentrate mixture containing 10.8, 54.3, 81.4 or 114 g urea/kg concentrate dry matter. Concentrate and treated straw was offered separately; the concentrate being offered twice daily in equal amounts. Each kg of concentrate mixture also contained 0.06 kg (2 oz) of a standard mineral mixture. Water was available *ad libitum* throughout the feeding trial. All animals were housed in individual pens in a well ventilated building. All animals were subjected to a pre-experimental period of four weeks prior

to the commencement of the digestibility trial proper. The digestibility of the four feeds was determined by a conventional digestibility trial. The voluntary intake of treated straw was measured by feeding daily an amount of ration to insure an excess of at least 10% over the previous days intake and determining the actual intake by daily weighing of refused feed. Daily feed and faecal collections were analysed for proximate constituents,[2] neutral detergent fibre, acid detergent fibre, cellulose, and silica.[5] Hemicellulose content was estimated as the difference between neutral detergent fibre and the acid detergent fibre contents.

The average chemical composition of treated straw and the concentrate mixture used in the feeding trial are given in Table 1. The composition and the estimated metabolizable energy (ME) content of the four rations is given in Table 2. Addition of urea to the concentrate mixture increased the crude protein equivalent of the rations from 7 to 12%. Intake of urea as a percentage of total dry matter consumed ranged from 0.37 to 3.15%.

Addition of urea to the concentrate component of the diet increased both organic matter digestibility and voluntary intake of treated straw (Table 2). As recorded in a previous experiment[8] with sheep, optimum utilization of urea npn appeared to occur around 2% level of supplementation.

The results of the present trial suggests that urea can be a useful source of npn for buffaloes when fed with alkali treated rice straw. Urea supplementation appears to increase the metabolizable energy value of rice straw by about 15%.

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TABLE 1. Average chemical composition of treated straw and concentrate mixture used in the feeding trial.

Component	Treated straw	Concentrate mixture
	(g/100 g dry matter*)	
Crude protein	2.1	11.9
Crude fibre	36.7	14.0
Ash	18.9	11.9
Neutral detergent fibre (NDF)	74.8	—
Acid detergent fibre (ADF)	56.3	—
Cellulose	36.4	—
Hemicelluloses	18.5	—
Silica	9.7	—

*dry matter content of straw — 92.6 g/100 g straw
dry matter content of concentrate — 92.1 g/100 g concentrate
concentrate mixture contained — Coconut oil meal (50%) Ricebran No. 1 (25%) and Maize meal (25%).

TABLE 2. Intake and apparent digestibility of the four rations along with their composition and estimated* metabolizable energy (ME) values.

Ration number	1	2	3	4	S.E of difference between means
Composition and ME values					
Crude protein equivalent of concentrate ration (g/100 g concentrate DM consumed)	17.86	27.50	31.46	38.45	—
Crude protein equivalent of total ration (g/100 g ration DM consumed)	7.38	9.28	9.45	11.80	—
Intake of urea (% total DM consumed)	0.37	1.56	2.10	3.15	—
Estimated ME content of ration (MJ/kgDM)	7.51	7.66	8.52	8.79	—
Intake					
Straw *ad libitum* (gDM/kg W $^{0.75}$)	61.20	73.64	83.67	82.05	+3.76
Digestibility of dietary constituents (%)					
Dry matter (DMD)	59.2	61.3	67.3	69.6	+1.72
Organic matter (OMD)	63.0	65.8	70.9	72.9	+1.53
Digestible organic matter in dry matter (DOMD)	51.8	52.9	58.8	60.6	+1.91

*ME estimated as 0.145 × DOMD9

References

1. AMMERMAN, C. B., GLADYS, J., VERDE; J., MOORE, J. E., BURNS, W. V. & CHICCO, C. F. (1972) *J. Anim. Sci.* **35**: 121.
2. Association of Official Agricultural Chemists (1970). 11th ed. Washington, D. C.
3. BRIGGS, M. H. (1967). *Urea as a protein supplement.* Pergamon Press. New York.
4. GUPTA, B. N., MURTY, V. N., KHAN, S. A. & MISHRA, B. P. (1965) *Ind. Vet. J.* **45**: 858.
5. GOERING, H. K. & VAN SOEST, P. J. (1970). *Forage fibre Analysis.* Agric. Handbook 379. U. S. Dept. of Agriculture.
6. JACKSON, M. G. (1977). *Anim. Feed Sci. Technol.* **2**: 105.
7. JAYASURIYA, M. C. N. (1979). *Tropical Agric.* (Trinidad). **56**: 75.
8. JAYASURIYA, M. C. N. (1979). *J. Natn. Sci. Coun. Sri Lanka.* **8** (1): 61.
9. Ministry of Agriculture, Fisheries and Food (1975). *Tech. Bull.* No. 33, London; HMSO.
10. OWEN, E. (1976). *Farm wastes, Straw and other fibrous material.* In Duckham, A. N., Jones J. G. W., and Roberts, E. H. (ed) Food Production and Consumption. *The efficiency of human food chains and nutrient cycles.* North Holland Publishing Co. p 299.