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BIOCHEMICAL CHANGES IN FATTENED ANIMALS AS AFFECTED BY UREA FEEDING

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The experiment was performed on six buffalo calves and old bullocks. They were fed on basal ration containing wheat straw and cane molasses. Urea was fed at 2.5 and 3.0 per cent level as the cost of cotton seed cake on nitrogen equivalent basis for ninety days. All the samples were analysed for total-N, protein-N, ammonia–N and Urea–N. All these nitrogen fractions increased in rumen liquor with increasing levels of urea. Protein–N, and total-N decreased in serum, liver and kidney but ammonia-N and urea–N increased. Various nitrogen fractions in adrenal, thigh and intercostal meat were not significantly affected. However, total–N and protein–N in intercostal and thigh meat of bullocks and testis of calves showed increase at one level and decrease at the other.

INTRODUCTION

Protein is one of the most important but costly nutrient in ruminant ration. Efforts are, therefore, being made to replace it by cheaper proteins as well as non-protein substances. Several non-protein nitrogens have been used as a replacement of protein in ruminant ration with encouraging results. Without doubt, non-protein nitrogenous compounds which has received more attention than any other is urea. The use of urea as a protein replacement has been one of the major developments in ruminant feeding practice during recent years. It has been found that 100 grams of rumen contents could convert 100 milligrams urea to ammonia in one hour (Barnett and PEID, 1961). It has also been found that calves maintained on a purified ration with urea as nitrogen source have been reported to have synthesised appreciable amounts of protein 6 hours after feeding (Agrawala *et al.*, 1953).

The present study is aimed at determining biochemical changes in tissues in response to high levels of urea in relation to fattened cattle and buffalo calves.

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MATERIALS AND METHODS

Six young buffalo calves and six old bullocks were fed a specific ration containing 2.5 and 3.0 per cent urea for ninety days. The animals were slaughtered after ninety days and their blood, rumen liquor, liver, kidney, lean meat from intercostal and thigh regions, adrenal glands and testis were analysed for total nitrogen, protein nitrogen, urea nitrogen and ammonia nitrogen. Total nitrogen, protein nitrogen and ammonia nitrogen were estimated following the method of Oser (1965). Urea nitrogen was determined by the method of Coulombe and Favrea (1963). The data was subjected to analysis of variance and the comparison of mean difference as suggested by DMR Test (Snedecor, 1959).

RESULTS AND DISCUSSION

Protein nitrogen and total nitrogen contents in the rumen liquor increased with the increase in the levels of urea in the ration of fattening calves. Urea nitrogen in the ration contributed 69.7 and 83.1 per cent of total nitrogen of the rations containing 2.5 and 3.0 per cent urea levels, respectively. These two rations were iso-nitrogenous hence the differences between protein nitrogen and total nitrogen contents in rumen liquor in case of these rations were statistically non-significant. The significantly lower protein and total nitrogen of the rumen liquor in case of control was probably due to lower total nitrogen contents of the rumen liquor fed as control. These results are in accordance with those of Davydenko and Iazarou (1975). They observed urea did not greatly affect the nitrogen in rumen liquor.

Ammonia nitrogen in the rumen liquor increased with the increase in the levels of urea in the ration. This is probably due to the fact that urea is decomposed by micro-organisms to ammonia but the decomposition rate does not make pace with its conversion rate to protein or its absorption into blood. Therefore, the ammonia-nitrogen contents of the rumen liquor continue increasing. The levels of urea and contribution of nitrogen from urea alongwith other relevant factors may account for such differences. Pal and Negi (1977) found the similar results. They found that with the increase in the levels of urea in the ration, ruminant ammonia increased.

Total nitrogen and protein nitrogen contents of serum decreased with the increase in the levels of urea (Table 1). This is probably due to more excretion of breakdown products of urea. These results are in conformity with the Singh and Sawhney (1967). They found the decrease in serum protein

with urea feeding. Ammonia nitrogen, urea nitrogen and other NPN increased with increasing levels of urea in the ration. It may be due to the fact that in case of urea rations, more ammonia is produced in rumen. So its greater amount comes in the blood than in case of control. Male fattening calves and old bullocks had similar pattern of various nitrogen fractions in serum as a result of higher levels of urea.

Total nitrogen, protein nitrogen, ammonia nitrogen, urea nitrogen and other NPN in liver of calves showed the pattern similar to that observed in case of blood serum. This may be due to the fact that blood values are reflected into the liver. Bullocks liver nitrogen fractions were also similar to that observed in case of calves liver except the other NPN. Calves and bullocks kidney total nitrogen, protein nitrogen, ammonia nitrogen and urea nitrogen has also same pattern as observed in case of blood serum. No significant differences were observed in various nitrogen fractions of adrenal gland and thigh and intercostal meat.

In testis total nitrogen and protein nitrogen increased at one level but decreased at the other level of urea in the ration. Total nitrogen and protein nitrogen in bullocks also showed the same pattern as observed in case of testis.

Table I. *Average composition of various nitrogen fractions (mg/100 ml) in serum of fattened buffalo calves fed high levels of urea.*

	Levels of urea percent		
	0	2.5	3.0
Total	1079.53	1013.62	869.948
Protein-N	1050.88	975.785	825.6655
Percent protein-N of Total-N	97.346	96.267	94.9097
NPN			
Ammonia-N	0.794	1.348	1.463
Urea-N	10.19	16.06	19.76
Other NPN	17.666	20.427	23.0575

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