DERIVATIVES OF PURINES AND NITROGEN COMPOUNDS IN CONFINED LAMBS

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Abstract

Purine derivatives (DP) originate from two sources, purines absorbed in the small intestine and endogenous purines, i.e., those released from nucleic acid metabolism, accurately reflecting ruminal microbial activity. In sheep, the absorbed purines can enter the liver unchanged and be made available for incorporation into tissue nucleic acids inn a process known as salvation or recovery. Both recovery and enzymatic degradation pathways are very active and compete for substrates. The objective of this study was to evaluate the spot urine collection method for estimation of purine derivatives and nitrogen compounds in confined lambs. Four male rumen-fistulated sheep were used, with mean initial age of 18 months and mean initial BW of 50 kg. The sheep were randomly assigned to four metabolic cages. The experimental design used was 4 x 4 Latin square (4 treatments and 4 periods/repetitions). Total urine collection was performed during three consecutive days, from the 9th to the 12th day of each experimental period. The urine produced throughout the day was collected in plastic buckets containing 100 mL of H2SO4 at 20% concentration, to avoid losses of nitrogenous compounds from the urine by volatilization and the bacterial destruction of purine derivatives. PD excretion was obtained by summing the amounts of allantoin, uric acid, xanthine and hypoxanthine excreted in the urine. The amount of absorbed microbial purines (X, mmol/day) was estimated from the excretion of DPT (Y, mmol/day), through the equation Y= 0.84X + (0.150 PV0, 75 e-0.25X), and the analyses were carried out using the R statistical program. The values estimated via spot collection of allantoin (mmol/day), uric acid (mmol/day) and xanthine-hypoxanthine (mmol /day) differed ($P<0.05$) from the values obtained via total collection in all groups of evaluated collection times. For more accurate results of purine derivatives, the total collection method is the most recommended. The estimated values via spot collection of DPT differed ($P<0.05$) from the values obtained via total collection in all groups and evaluated collection times. Chen et al. (1992) observed variations in urinary creatinine and DP concentrations throughout the day, but the observed creatinine concentration variations were similar to the observed variations for PD excretion. The absence of the effect of the time of collection on the DP:creatinine ratio has great practical application, indicating that spot urine sampling can be used to calculate the DP excretion at any time of day. In the present study, the urinary ratio between DP:creatine showed an average excretion of 1.98. Silva Junior (2014), in a study of grazing cattle, found an average DP:creatinine ratio of 1.48, with no effect ($P>0.05$) of treatments, collection days and collection period on that ratio. We can recommend carrying out spot urine collection at 0, 2, 4, 6 and 8 hours after feeding to estimate urinary volume, production of purine derivatives and estimates of intestinal flow of microbial N due to divergence of results between spot urine collection times compared to total collection.

Keywords

Liver, metabolism, microbial protein, microbial nitrogen, sheep farming.