

SPOT URINE COLLECTION METHOD TO ESTIMATE CREATININE LEVELS IN IN CONFINED LAMBS

Juliana A. Vieira¹; Darcilene M. de Figueiredo²; Gabriel B. Pacheco¹; Gabriel Machado Dallago³ Luciana Navajas Rennó⁴, Jannilson G. Barroso⁴; Ana Laurinda M. Rodrigues²

¹Universidade Federal dos Vales do Jequitinhonha e Mucuri, Departamento de Zootecnia, Programa de Pós-Graduação em Zootecnia, Diamantina, MG, Brazil;

²Universidade Federal dos Vales do Jequitinhonha e Mucuri, Departamento de Zootecnia, DZO/UFVJM, Diamantina, MG, Brazil;

³McGill University, Québec, Canadá;

⁴Universidade Federal dos Vales do Jequitinhonha e Mucuri, Departamento de Zootecnia, DZO/UFVJM, Diamantina, MG, Brazil.

*Corresponding author: darcilenefigueiredo@ufvjm.edu.br

Abstract

The spot sampling method is based on creatinine concentration in the sample, as a representative of its concentration in the total urine excreted within 24 hours. The estimated daily creatinine excretion of an animal is, based on equations developed by different authors, which presuppose that creatinine excretion by body weight is constant or varies only slightly, depending on the animal's body protein content (amount of muscles). However, creatinine excretion per unit cannot be represented by a constant value for animals of different groups or genetic categories, raising doubts about the possibility of using creatinine excretion values obtained in a given study. Thus, many authors have suggested that the collection of an isolated sample, called a spot sample, can simplify the estimation of urine production. To this end, four male sheep fistulated in the rumen were analyzed, with age of 18 months and initial average body weight of 50 kg. The animals were randomly distributed in four metabolic cages. The experimental design used was 4 x 4 Latin square (4 treatments and 4 periods/repetitions), for a total of 52 collections. Spot collection was conducted at five times after feeding (0h; 2h; 4h; 6h and 8h). These urine collections were established on the 13th day of each experimental period. All possible clusters of spot collections were tested. The urine spot collection method involves sampling strategies to establish a reliable protocol to estimate synthesis and excretion by sheep. Creatine excretion, urinary volume, total purine derivatives, absorbed purines, microbial compound flow and microbial synthesis efficiency through total urine collection were determined by chemical analysis. Average statistics were calculated by the R software. The adjusted averages for each spot collection time, as well as the average spot collection and all possible combinations between the time of spot collection were compared to the adjusted averages of total collection. The creatinine excretion value obtained through the total collection of urine did not differ ($p > 0.05$) from the value estimated by the spot urine collection at 0h, 2h and 8h, with difference ($p < 0.05$) between collection times of 4h and 6h. The urinary volume obtained by total collection in relation to that estimated by spot collection differed ($p < 0.05$) for 4h and 6h after feeding. The average obtained for this parameter also differed for the following groups of collection according to times after feeding regarding total collection: 0h and 6h; 4h and 6h; 0h, 4h and 6h. When expressed as a function of PC, creatinine excretion decreased linearly at 0.000097 mmol/kg PC ($p < 0.001$) for each unit (kg) of PC increase. This behavior was associated with variation in the proportion of muscle tissue in growing animals. It might be that since the growth of muscle tissue in adult animals is less intense than in juveniles, and since creatinine comes from muscle tissue metabolism and is excreted proportionally to the metabolic activity, creatinine excretion as a function of PC varies less in adult animals. Spot urine collection is recommended at 0, 2, 4, 6 and 8 hours after feeding to estimate the urinary volume.

Keywords

Sheep farming, Metabolism, Muscle tissue, Feeding, Urinary volume.