

Raw meat diet reduces urinary oxalate and calcium excretion rate in dogs.

J.C. Dijcker^a, E.A. Hagen-Plantinga^a, H. Everts^a, G. Bosch^b, I.P. Kema^c, W.H. Hendriks^{a,b}.

^a Division of Nutrition, Faculty of Veterinary Medicine, Utrecht University, Yalelaan 7, 3584 CL, Utrecht, The Netherlands

^b Animal Nutrition Group, Wageningen University, PO Box 338, 6700 AH Wageningen, The Netherlands

^c Department of Laboratory Medicine, University Medical Center, University of Groningen, PO Box 30.001, 9700 RB, Groningen, The Netherlands

Introduction

In dogs, one of the most common stone detected in the urinary tract is composed of calcium oxalate. Two pivotal conditions in calcium oxalate urolithiasis are an increased urinary oxalate and calcium excretion (Dijcker, 2011).

This cohort study evaluated the range of urinary oxalate and calcium excretion within the dog population not suffering from urolithiasis in the Netherlands and identified dietary- and animal-related factors associated with these urine parameters. A second study was performed to determine the effect of a commercial raw meat vs. dry food on urinary oxalate and calcium excretion in a crossover design in dogs.

Material & Methods

Spot urine samples were collected from 141 privately-owned dogs. Information regarding dietary- and animal-related factors and health status was collected through a questionnaire. Data analyses to identify dietary- and animal-related factors associated with changes in oxalate:creatinine (Ox:Cr) or calcium:creatinine (Ca:Cr) in the urine were performed by ANOVA using multivariate linear regression analysis (excluding the independent variables with type III SS of $P > 0.05$).

In the second study, spot urine samples were collected from 23 privately-owned dogs fed a dry and raw meat diet in cross-over design in a 4-week period in random order.

Results

Urine Ox:Cr ranged from 21.1 to 170.6 mmol oxalate/mol creatinine and urine Ca:Cr ranged from 3.4 to 462.8 mmol/mol. For both urine parameters, increased excretion was associated with dry food intake, <1 snack/day and breed, whereas increased urine Ox:Cr was associated to male dogs as well.

In the second study, feeding the dry food resulted in higher urine Ox:Cr ($P < 0.001$) and Ca:Cr ($P < 0.022$) excretions in dogs.

Discussion

The range of urine Ox:Cr and Ca:Cr of dogs observed in the present study was broad and was covering most of the values reported before in experimental studies. In the dogs of the cohort study, intake of dry diet, compared to raw meat diet, was found to be associated with higher urine Ox:Cr and Ca:Cr. This finding was substantiated in crossover study, where dogs were fed a commercial raw meat and dry diet. The use of spot urine sampling, i.e. the use of urine Ox:Cr and Ca:Cr, is known not to be as accurate as quantitative urine sampling. Therefore, additional studies with quantitative urine collections are recommended to test the association with the identified factors of this study.

References

Dijcker J.C., Plantinga E.A., Van Baal J. & Hendriks W.H. (2011) Influence of nutrition on feline calcium oxalate urolithiasis with emphasis on endogenous oxalate synthesis. *Nutrition Research Reviews* 24, 96-110

NRC (2006) Nutrient requirements of dogs and cats. National Research Council (NRC). 1st edn., The National Academies Press, Washington