

# Effect of new high-protein dry diets on urinary parameters in cats and *in vitro* struvite dissolution

D. Formankova<sup>a</sup>, I. Leriche<sup>b</sup>, C. Iben<sup>a</sup>

<sup>a</sup> Department of Farm Animals and Veterinary Public Health, University of Veterinary Medicine, Vienna, Austria  
<sup>b</sup> Research & Development Department, Virbac Nutrition, Vauvert, France

## Introduction

Beside urine pH, the relative supersaturation (RSS) plays an important role in dissolution of struvite uroliths and prevention of the formation of calcium oxalate uroliths in cats.<sup>1</sup> In an *in vitro* dissolution trial, Van Hoek *et al.* showed that RSS was a better predictor for struvite dissolution than the urinary pH.<sup>2</sup>

**The aim of this study was to assess the urinary parameters and struvite crystal solubility in cats fed 3 new high-protein dry diets, in comparison to that of 2 commercial dry diets.**

## Animals, materials and methods

Each of 10 healthy adult cats was fed each diet (D1-D5) for a period of 7 days (dietary adaptation) prior to a 7 to 9 days collection period, in a cross-over design. D1, D2 and D3 were 3 test diets for cats, with a high protein and low carbohydrate content. D1 was intended for maintenance of adult cats. D2 was intended for "reduction of struvite stone recurrence" and D3 for "dissolution of struvite stones". D4\* and D5\*\* were commercial diets for cats, intended for "dissolution of struvite stones", used as references in this study. Daily rations were calculated to maintain the cats' body weight. Cats were housed in single cages which allowed to collect the urine. Food intake, water intake, urine volume and specific gravity were documented. Urine analyses and RSS calculations were done at the Institute of Animal Nutrition, Veterinary Faculty, Berlin. For the *in vitro* dissolution trial, 1 g of struvite crystal

(ammonium magnesium phosphate hexahydrate 98 %; VWR, Vienna, Austria) was mixed with 20 ml of the filtered (589<sup>2</sup> White Ribbon S&S) urine, 6 of these samples were prepared for each diet. Samples were stored in a 38 °C water bath and shaken (80/min). After 2 days, 3 respective samples were filtered, dried and weighed. The same procedure followed after 5 days for the remaining 3 samples of each diet.

**Table 1: Nutritional characteristics of the 3 test diets**

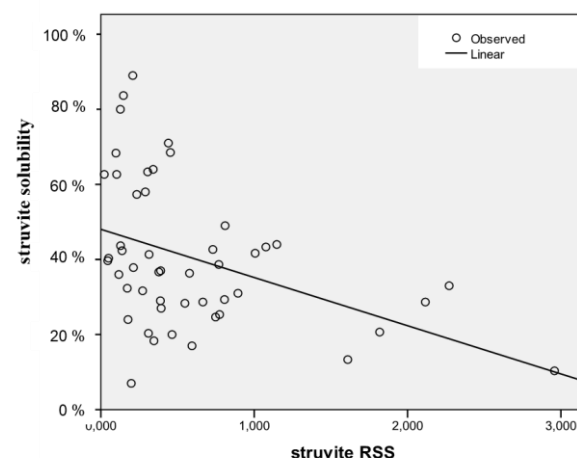
	Diet 1	Diet 2	Diet 3
Crude protein (% ME)	46	46	44
Crude fat (% ME)	36	34	38
Nitrogen Free Extract (% ME)	18	20	18
<i>In vivo</i> ME (kcal/100g)	407	413	420
Sodium (% DM)	0.80	1.14	1.36

## Results

There was no significant difference in mean water intake, urinary volume and specific gravity between the 5 groups. The mean urinary pH varied from 6.0 to 6.5, it was significantly lower with D5 (Table 2). The Ca oxalate RSS varied from 4.29 to 6.58, with no significant difference between groups, and was within the range of metastable supersaturation ( $1 < \text{oxRSS} < 12$ ) with all the diets. The struvite RSS with D1 was in the range of metastable supersaturation ( $1 < \text{stRSS} < 2.5$ ), the other diets generated undersaturated urines with  $\text{stRSS} < 1$ . The struvite

solubility after 5 days was statistically similar with D1, D2 and D4, and was significantly higher with D3 and D5. There was a significant correlation ( $-0.401$ ) between the struvite RSS and the struvite solubility after 5 days (Fig. 1).

**Fig. 1: Correlation between struvite RSS and struvite solubility after 5 days**



**Table 2: Urinary parameters with the different diets**

	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Urinary pH	6.5±0.2	6.5±0.2	6.4±0.2	6.5±0.2	6.0±0.1
Struvite RSS	1.11±0.82	0.64±0.34	0.45±0.66	0.60±0.58	0.23±0.23
Ca oxalate RSS	4.35±2.41	4.68±2.68	5.89±4.02	4.29±2.54	6.58±5.17

## Conclusion

**The results of this study show that the test high-protein diets D2 and D3 are as efficient as the reference diets D4 and D5 for struvite dissolution. They could be recommended for both dissolution and prevention of struvite stones, and reduction of calcium oxalate stones formation in cats.**

\*Royal Canin Veterinary Exclusive Feline Urinary S/O \*\*Hill's Prescription Diet s/d Feline Dissolution

References: 1) Smith *et al.* J Nutr 1998; 128: 2763S-2764S. 2) Van Hoek *et al.* Vet Focus 2009; 19: 47-48.