



## SUMMARY

ROYAL CANIN Veterinary Diet<sup>TM/MC</sup> feline URINARY SO 30<sup>TM/MC</sup> (dry) and URINARY SO<sup>TM/MC</sup> IN GEL (canned) are complete and balanced diets for adult cats that have been formulated to aid in the management of feline lower urinary tract disease (LUTD).

## INDICATIONS

For cats with or at risk of developing feline lower urinary tract disease

Dry format:

- Dissolve pure struvite uroliths
- Helps prevent the formation of struvite uroliths
- Helps minimize the risk of formation of calcium oxalate
- Helps minimize the risk of formation of brushite uroliths

Canned format:

- Dissolve pure struvite uroliths
- Helps prevent the formation of struvite uroliths
- Helps minimize the risk of formation of calcium oxalate uroliths
- Helps minimize the risk of formation of brushite uroliths
- Aids in the management of idiopathic cystitis, which may present with the following signs:
  - Hematuria, dysuria, stranguria, pollakiuria
  - Inappropriate urination

## CONTRAINDICATIONS

- Growing kittens
- Pregnant or lactating queens
- Concurrent use of urinary acidifiers

## NUTRITIONAL DIFFERENCES

(as compared to typical commercial pet foods)

- Promotes the production of urine undersaturated (RSS < 1.0) for struvite
- Promotes the production of urine metastable (RSS < 12) for calcium oxalate

**FELINE**

- Formulated to promote increased urine volume
  - High moisture content in canned format
  - Increased sodium chloride content in both canned and dry formats
- Moderately restricted magnesium levels
- Controlled levels of calcium and oxalate
- Moderately restricted phosphorus levels
- Increased levels of potassium
- Enriched with antioxidants

## RATIONALE

Ten years ago, the majority of uroliths removed from cats were struvite (magnesium ammonium phosphate). Since struvite formation is highly dependent on urine pH, diets designed for managing struvite uroliths encouraged the production of severely acidic urine and were highly restricted in magnesium.

In the past ten years, there has been an increase in the incidence of calcium oxalate urolithiasis. The dietary management tools for struvite (acidification and severe magnesium restriction) have been suggested to be risk factors for calcium oxalate urolith formation.

The management of calcium oxalate urolithiasis is far more challenging than struvite urolithiasis. In humans, calcium oxalate uroliths can form in urine across the full range of normal pH values (4.8-7.4). Urine pH manipulation cannot be used to reliably manage calcium oxalate urolithiasis, nor is the restriction of dietary calcium and oxalate effective in preventing oxalate urolith formation.

Diets specifically designed to prevent one type of urolith may greatly increase the risk of the other type of urolith forming. Waltham Science has taken a safer approach and invested years of research in developing a single diet which effectively reduces the risks for both types of uroliths simultaneously.

URINARY SO 30<sup>TM/MC</sup> (dry) and URINARY SO<sup>TM/MC</sup> IN GEL (canned) are the first and only diets which have been clinically proven to reduce the risk of both struvite and calcium oxalate urolithiasis.

## Urine Evaluation Using RSS

The desire to develop diets which effectively manage both struvite and calcium oxalate urolithiasis in pets led Waltham to explore complex research methods for predicting urolithiasis risk in dogs and cats.

The predominant urolith in humans is calcium oxalate and more than 30 years ago, human urologists began looking at ways of predicting the risk of calcium oxalate formation in human patients.

The result was the development of a research methodology known as RSS or Relative SuperSaturation. This methodology involves the analysis of 12 constituents of a collected urine sample, as well as the determination of its pH. These data are then analyzed using a computer program that calculates the concentrations of the large number of possible interactive complexes between all ions present in this urine.

Finally, the program calculates the activity product of the urine sample for a given urolith and divides this number by the known constant thermodynamic solubility product for that urolith to determine RSS. If the sample's activity product is less than the constant, then  $RSS < 1.0$  and the urine is said to be "undersaturated" for that urolith.

## Using RSS to assess the risk of struvite urolith formation in cats

If a diet has an RSS for struvite of:	The urine produced by cats fed that diet is said to be:	The risk for struvite formation is:
Less than 1	Undersaturated	<ul style="list-style-type: none"> <li>• New struvite uroliths will not form</li> <li>• Existing struvite uroliths will dissolve</li> </ul>
Between 1 and 2.5	Metastable	<ul style="list-style-type: none"> <li>• New struvite uroliths will not form</li> <li>• Any existing struvite uroliths will not dissolve and may grow</li> </ul>
Over 2.5	Oversaturated	<ul style="list-style-type: none"> <li>• New struvite uroliths may form</li> <li>• Any existing struvite uroliths will grow</li> </ul>

## Using RSS to assess the risk of calcium oxalate urolith formation in cats

If a diet has an RSS for calcium oxalate of:	The urine produced by cats fed that diet is said to be:	The risk for calcium oxalate formation is:
Less than 1	Undersaturated	<ul style="list-style-type: none"> <li>• New calcium oxalate uroliths will not form</li> <li>• Existing calcium oxalate uroliths will not grow</li> </ul>
Between 1 and 12	Metastable	<ul style="list-style-type: none"> <li>• New calcium oxalate uroliths will not form</li> <li>• Any existing calcium oxalate uroliths may grow</li> </ul>
Over 12	Oversaturated	<ul style="list-style-type: none"> <li>• New calcium oxalate uroliths may form</li> <li>• Any existing calcium oxalate uroliths will grow</li> </ul>



**FELINE**

## The table below provides some important RSS values for struvite and calcium oxalate

To achieve the following	Choose a diet which has	To avoid the risk of alternative urolith, this diet should also have
Dissolve pure struvite uroliths	RSS for struvite < 1.0	RSS for calcium oxalate < 12
Minimize the risk of struvite uroliths	RSS for struvite < 2.5	RSS for calcium oxalate < 12
Dissolve calcium oxalate uroliths	It is not physiologically possible to dissolve calcium oxalate uroliths. They must be removed surgically	
Minimize the risk of calcium oxalate uroliths	RSS for calcium oxalate < 12	RSS for struvite < 2.5

## Urinary Relative SuperSaturation (RSS) values for struvite and calcium oxalate in cats fed URINARY SO<sup>TM/MC</sup> IN GEL and URINARY SO 30<sup>TM/MC</sup>

	URINARY SO <sup>TM/MC</sup> IN GEL	URINARY SO 30 <sup>TM/MC</sup>
	Canned	Dry
RSS for struvite	0.53 ± 0.31	0.05 ± 0.004
RSS for calcium oxalate	1.6 ± 0.42	0.76 ± 0.11

URINARY SO<sup>TM/MC</sup> IN GEL (canned) and URINARY SO 30<sup>TM/MC</sup> (dry) are the first and only diets which have been clinically proven to aid in the management of both struvite and calcium oxalate urolithiasis in cats.

## Idiopathic Cystitis

A clinical study examined the recurrence of signs of lower urinary tract disease in 54 client-owned cats with idiopathic (or interstitial) cystitis. Recurrence rate for the year prior to the beginning of the study was 96%, with 52 cats having had at least one episode of LUTD signs in the previous year.

Signs did not recur in 89% of cats fed URINARY SO<sup>TM/MC</sup> IN GEL in canned format, while 61% of cats fed the URINARY SO 30<sup>TM/MC</sup> in dry format did not have a recurrence of signs over the 12 month trial period.

The proportion of cats in which clinical signs recurred was significantly lower in the canned diet group than in the dry group. Canned URINARY SO<sup>TM/MC</sup> IN GEL is the only diet proven to be beneficial in the management of feline idiopathic cystitis.



## Special Tips

- URINARY SO<sup>TM/MC</sup> IN GEL (canned) and URINARY SO 30<sup>TM/MC</sup> (dry) are designed to increase urine volume and dilution by increasing body water turnover. This diet is designed to increase water intake in the cat and increase the volume and frequency of urination.
- It is important to counsel owners to expect changes in drinking and urination behavior and to make sure they understand that these changes are desirable and beneficial for their cat.
- Fresh water should be readily available at all times.
- Owners may need to clean their cat's litter box more frequently.

## GENERAL FEEDING RECOMMENDATIONS

- Daily feeding recommendations may be divided into two to four meals.
- Fresh water should be available at all times.
- Individual requirements may vary depending on breed, age, sex, environment, and activity level.

## FEEDING GUIDE

### FEEDING RECOMMENDATIONS FOR FELINE ADULT MAINTENANCE

Body Weight		Suggested Caloric Intake kcal/day	Daily Feeding	
lb	kg		Cans Only (cans/day)	Dry Only (8-oz cups/day)
5	2.3	136	3/4	1/2
7	3.2	191	1	2/3
9	4.1	245	1 1/2	3/4
11	5.0	299	1 3/4	1
13	5.9	354	2	1 1/4
15	6.8	408	2 1/3	1 1/3
17	7.7	463	2 3/4	1 1/2



## PRODUCT DESCRIPTION

ROYAL CANIN Veterinary Diet™/MC feline URINARY SO™/MC IN GEL is a palatable, complete diet for adult cats specifically designed to ensure the production of a urine undersaturated with struvite and with a level of calcium oxalate saturation at which spontaneous homogeneous crystallization will not occur. This is achieved through the production of a large volume of moderately acidic, dilute urine and controlled magnesium, calcium, and oxalate levels.

## NUTRITION STATEMENT

Animal feeding tests using AAFCO procedures substantiate that URINARY SO™/MC IN GEL provides complete and balanced nutrition for the maintenance of adult cats.



Clinically proven to reduce the reoccurrence of clinical signs of feline idiopathic or interstitial cystitis.



Increasing the urine volume simultaneously reduces the saturation of urine with calcium oxalate and struvite preventing the two major types of urolithiasis.



Effectively dissolves pure struvite uroliths.

## GUARANTEED ANALYSIS

Crude Protein, (min)	6.0%
Crude Fat, (min)	7.0%
Crude Fiber, (max)	1.0%
Moisture, (max)	85.0%

## METABOLIZABLE ENERGY

From Protein	31.1%
From Fat	65.1%
From Carbohydrate	3.8%

Approximately 170 kcal per 5.8 oz (165 g) can (103 kcal per 100 g).

## INGREDIENTS

WATER, MEAT BY-PRODUCTS, CHICKEN BY-PRODUCTS, ANIMAL FAT (PRESERVED WITH BHA/BHT), NATURAL FLAVORS, TRACE MINERALS (SODIUM TRIPOLYPHOSPHATE, CALCIUM SULFATE, POTASSIUM CHLORIDE, CALCIUM CARBONATE, MAGNESIUM SULFATE, MANGANESE SULFATE, ZINC SULFATE), GUAR GUM, CARRAGEENAN, CAROB GUM, TAURINE, VITAMINS (CHOLINE CHLORIDE, DL-ALPHA TOCOPHEROL ACETATE [SOURCE OF VITAMIN E], VITAMIN D3 SUPPLEMENT, THIAMINE MONONITRATE [VITAMIN B1], PYRIDOXINE HYDROCHLORIDE [VITAMIN B6], FOLIC ACID), DL-METHIONINE.



## FELINE

### TYPICAL ANALYSIS

Nutrient	Unit	Per 100 g as fed	Per 1000 kcal
Moisture	g	79.36	
Protein	g	8.53	82.82
Fat	g	9.06	87.96
Carbohydrate	g	1.35	13.11
Ash	g	1.7	16.5
Crude Fiber	g	0.51	4.95
<b>Minerals</b>			
Calcium	g	0.21	2.04
Phosphorus	g	0.28	2.72
Sodium	g	0.21	2.04
Chloride	g	0.30	2.91
Potassium	g	0.21	2.04
Magnesium	g	0.02	0.19
Copper	mg	1.01	9.78
Iron	mg	4.05	39.31
Zinc	mg	4.19	40.66
Manganese	mg	2.78	27.02
Iodine	mg	0.035	0.340
<b>Vitamins</b>			
Vitamin A	IU	1900	18447
Vitamin D3	IU	31	301
Vitamin E	mg	14.2	137.9
Thiamine (B1)	mg	0.40	3.88
Riboflavin (B2)	mg	0.60	5.83
Niacin	mg	3.32	32.23
Pyridoxine (B6)	mg	0.22	2.14
Pantothenic Acid	mg	1.41	13.69
Folic Acid	mg	0.16	1.553
Cobalamin (B12)	mg	0.0118	0.1146
Biotin	mg	0.03	0.291
Choline	mg	134	1301
<b>Fatty Acids</b>			
Linoleic acid	g	0.81	7.86
Arachidonic acid	g	0.09	0.87
<b>Amino Acids</b>			
Arginine	g	0.50	4.85
Lysine	g	0.55	5.34
Methionine	g	0.27	2.62
Methionine + Cystine	g	0.36	3.49
Taurine	g	0.13	1.26



### ORDERING INFORMATION

Can	Weight		Item Code
	oz	g	
24 per case	5.82	165	K60415

## PRODUCT DESCRIPTION

ROYAL CANIN Veterinary Diet™<sup>TM/MC</sup> feline URINARY SO 30™<sup>TM/MC</sup> is a palatable, complete diet for adult cats specifically designed to ensure the production of a urine undersaturated with struvite and with a level of calcium oxalate saturation at which spontaneous homogeneous crystallization will not occur. This is achieved through the production of a large volume of moderately acidic, dilute urine and controlled magnesium, calcium, and oxalate levels.

## NUTRITION STATEMENT

URINARY SO 30™<sup>TM/MC</sup> is formulated to meet the nutritional levels established by the AAFCO Cat Food Nutrient Profiles for adult maintenance.



**RELATIVE SUPER SATURATION**  
Relative SuperSaturation (RSS) methodology predicts the crystallization potential of urine. RSS is used to develop diets that control both struvite and calcium oxalate urolithiasis.



**URINE DILUTION**  
Increasing the urine volume simultaneously reduces the saturation of urine with calcium oxalate and struvite, preventing the two major types of urolithiasis.



**STRUVITE DISSOLUTION**  
Effectively dissolves pure struvite uroliths.



**NATURAL PRESERVATIVE**  
Naturally preserved with mixed tocopherols, rosemary extract, and citric acid.

## GUARANTEED ANALYSIS

Crude Protein, (min)	30.2%
Crude Fat, (min)	15.5%
Crude Fiber, (max)	5.0%
Moisture, (max)	8.5%

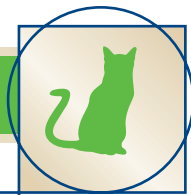
## METABOLIZABLE ENERGY

From Protein	31.3%
From Fat	38.3%
From Carbohydrate	30.4%

Approximately 302 kcal per 8-oz cup; 412 kcal per 100 g; 73 g per 8-oz cup.

## INGREDIENTS

CHICKEN MEAL, RICE, CORN GLUTEN MEAL, GROUND CORN, CHICKEN FAT, NATURAL FLAVORS, CELLULOSE POWDER, SODIUM CHLORIDE, DRIED BREWERS YEAST, DRIED EGG POWDER, POTASSIUM CHLORIDE, CALCIUM SULFATE, MONOSODIUM PHOSPHATE, CHOLINE CHLORIDE, CALCIUM CARBONATE, TAURINE, DL-METHIONINE, VITAMINS [DL-ALPHA TOCOPHEROL (SOURCE OF VITAMIN E), NIACIN, BIOTIN, RIBOFLAVIN (VITAMIN B2), D-CALCIUM PANTOTHENATE, PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), THIAMINE MONONITRATE (VITAMIN B1), VITAMIN B12 SUPPLEMENT, VITAMIN A ACETATE, VITAMIN D3 SUPPLEMENT, FOLIC ACID], TRACE MINERALS [ZINC OXIDE, FERROUS SULFATE, COPPER SULFATE, MANGANOUS OXIDE, SODIUM SELENITE, CALCIUM IODATE], PRESERVED WITH NATURAL MIXED TOCOPHEROLS, ROSEMARY EXTRACT, AND CITRIC ACID.



## FELINE

### TYPICAL ANALYSIS

Nutrient	Unit	Per 100 g as fed	Per 1000 kcal
Moisture	g	7	
Protein	g	32.2	78.3
Fat	g	17.5	42.5
Carbohydrate	g	31.3	76.1
Ash	g	9.0	21.9
Crude Fiber	g	3.0	7.3
Total Dietary Fiber	g	5.5	13.4
<b>Minerals</b>			
Calcium	g	1.00	2.43
Phosphorus	g	0.80	1.94
Sodium	g	1.30	3.16
Chloride	g	2.42	5.88
Potassium	g	1.00	2.43
Magnesium	g	0.07	0.17
Copper	mg	3.0	7.3
Iron	mg	17.0	41.3
Zinc	mg	21.1	51.3
Manganese	mg	5.9	14.3
Iodine	mg	0.36	0.87
Selenium	mg	0.026	0.063
<b>Vitamins</b>			
Vitamin A	IU	2100	5103
Vitamin D3	IU	115	279
Vitamin E	mg	30	72.90
Thiamine (B1)	mg	1.4	3.4
Riboflavin (B2)	mg	4.9	11.9
Niacin	mg	15.4	37.4
Pyridoxine (B6)	mg	4.1	10.0
Pantothenic Acid	mg	5.5	13.4
Folic Acid	mg	1.2	2.9
Cobalamin (B12)	mg	0.014	0.034
Biotin	mg	0.31	0.75
Choline	mg	300	729
<b>Fatty Acids</b>			
Linoleic acid	g	3.95	9.6
Arachidonic acid	g	0.08	0.19
<b>Amino Acids</b>			
Arginine	g	1.7	4.1
Lysine	g	1.25	3.0
Methionine	g	0.85	2.1
Methionine + Cystine	g	1.3	3.2
Taurine	g	0.37	0.9



### ORDERING INFORMATION

Bag Size	Weight		Item Code
	lb	kg	
Small	2.5	1.14	26803
Medium	5.5	2.5	26806
Large	16.5	7.95	26817

## REFERENCES

- Hawthorne AJ, Markwell PJ. The effect of dietary sodium content on water intake and urine composition in cats. Proceedings of the Waltham International Science Symposium, Bangkok, Thailand, October 28-31, 2003, p40.
- Robertson WG, Jones JS, Heaton MA, et al. Predicting the crystallization potential of urine from cats and dogs with respect to calcium oxalate and magnesium ammonium phosphate (struvite). *J Nutr* 2002;132:1637S-41S.
- Luckshander N, Iben C, Desprez C, et al. Does increasing dietary NaCl affect blood pressure in adult healthy cats? *J Vet Intern Med* 2002;16:788.
- Robertson WG, Jones J, Heaton MA, et al. Predicting the calcium oxalate and magnesium ammonium phosphate crystallization potential of dog and cat urine. Waltham International Symposium - Pet Nutrition coming of Age - Canada. 24. (2001).
- Smith BHE, Moodie S, Markwell PJ. Long term feeding of an acidifying diet to cats. *J Vet Intern Med* 2001;15:305.
- Biourge V, Devois C, Morice G, et al. Une supplémentation en sel n'augmente pas l'indice des super-saturations urinaires en oxalate de Calcium chez les chats adultes sains. Congrès CNVSPA-AFVAC, SAVAB Lille 23-25 Novembre 2001 p295.
- Luckshander N, Iben C, Gabler C, et al. Is there any effect of increasing dietary NaCl diet on blood pressure in healthy cats? Proceedings of the 11 TH ESCVM Congress, Dublin Sept 5-8, 2001, p72.
- Biourge V, Devois C, Morice G, et al. Dietary NaCl significantly increases urine volume but does not increase urinary calcium oxalate supersaturation in healthy cats. *J Vet Intern Med* 2001;866.
- Schwendenwein I, Iben C, Wagner E, et al. Effect of increasing dietary NaCl on fractional electrolyte clearance. Proceedings of the 5th ESCVN Conference. Sursee, Switzerland. 2001, p93.
- Devois C, Biourge V, Morice G, et al. Dietary NaCl supplementation does not increase urinary calcium oxalate relative supersaturation in healthy adult cats. BSAVA Congress 2001. Scientific Proceedings p509.
- Stevenson AE, Wrigglesworth DJ, Markwell PJ. Urine pH and Urinary Relative Supersaturation in Healthy Adult Cats. *Urolithiasis* 2000;818-820.
- Reed CF, Markwell PJ, Jones CA, et al. Oral orthophosphate salt administration and its effect on feline urinary calcium oxalate formation and agglomeration. *J Vet Intern Med*; 2000;14:351.
- Stevenson AE, Markwell PJ, Kasidas GP. Quantitative analysis of feline uroliths within Europe in 1998-99. *J Vet Intern Med* 2000;14:383.
- Reed CF, Markwell PJ, Jones CA, et al. The effects of oral magnesium salt administration on urinary calcium oxalate crystallization and agglomeration in cats. *J Vet Intern Med* 2000;14:383.
- Reed CF, Markwell PJ, Jones CA, et al. In vitro pyrophosphate supplementation in cat urine, and its effect on calcium oxalate formation and agglomeration. *J Vet Intern Med* 2000;14:384.
- Devois C, Biourge V, Morice G, et al. Influence of various amounts of dietary NaCl on urinary Na, Ca, and oxalate concentrations and excretions in adult cats. Proceedings of the 10th ESVIM Congress, Neuchâtel, Suisse. Sept 14-16, 2000, p85.
- Devois C, Biourge V, Morice G, et al. Struvite and oxalate activity product ratios and crystalluria in cats fed acidifying diets. *Urolithiasis* 2000. Feb 13-17. Cape Town 821-823.
- Markwell PJ. Lower urinary tract diseases in cats: dietary and medical management. *Wiener Tierärztlicher Monatschrift* 1999;86:8-12.
- Markwell PJ, Smith BHE, McCarthy K. A non-invasive method for assessing the effect of diet on urinary calcium oxalate and struvite supersaturation in the cat. *Animal Technology* 1999;50:61-67.
- Markwell PJ, Buffington CA, Chew DJ, et al. Clinical evaluation of commercial acidified diets in the management of idiopathic cystitis in cats. *J Am Vet Med Assoc* 1999;214:361-365.
- Dumon H, Nguyen P, Martin L, et al. Influence of wet vs dry food on cat urinary pH: preliminary study. *J Vet Intern Med* 1999, abstract 138.
- Markwell PJ, Buffington CA, Chew DJ, et al. Clinical evaluation of commercial acidified diets in the management of idiopathic cystitis in cats. *J Vet Intern Med* 1998;12:222.
- Markwell PJ, Buffington CT, Smith BH. The effect of diet on lower urinary tract disease in cats. *J Nutr* 1998;128:2753S-2757S.
- Smith BH, Stevenson AE, Markwell PJ. Urinary relative supersaturations of calcium oxalate and struvite in cats are influenced by diet. *J Nutr* 1998;128:2763S-64S.
- Smith BHE, Buffington CA, Markwell PJ. Comparative species urine pH data. *J Vet Intern Med* 1996;10:189.
- Smith BHE, Stevenson AE, Markwell PJ. Effect of diet on urinary saturation in cats. Proceedings of the 2nd FECAVA Congress 1995;359-360.
- Filippich LJ. Feline lower urinary tract disease: clinical dietary study. *Australian Veterinary Practitioner* 1994;24:16-22.

