

### Urolithiasis Comparison Chart VET 433C

Stone Type	Predisposition	Risk Factors	Nutritional Management
<p>Calcium Oxalate</p>	<p>Middle age Male predisposition</p> <p>Dog Breeds: Standard Poodle, Pomeranian, Brussels Griffon, Lhasa Apso, Miniature Schnauzer &amp; Bichon</p> <p>Cat Breeds: Burmese, Persian</p>	<p>Genetics</p> <p>Hypercalciuria (idiopathic)</p> <p>Decreased fluid intake</p> <p>Acidified urine</p> <p>Increased protein diet, type is important</p> <p>Promotors and inhibitors Ca, Na, Vit. C, Vit. D.</p>	<p>Specific dietary factors have not been shown to reduce the recurrence rate of CaOx</p> <p>General principles</p> <ol style="list-style-type: none"> <li>1. Reduce precursors</li> <li>2. Modify pH</li> <li>3. Dilute urine</li> </ol> <p>Reduce urinary excretion of calcium and oxalate Dilute urine Increase solubility of urinary calcium</p> <p>Not as pH dependent as other uroliths, most diets used to dissolve struvite can be successfully used to manage CaOx</p> <p>Controlling precursor excretion Avoid calcium restriction Avoid oxalate-rich food (leafy greens, things grown in the ground *beets, potatoes, most pulses and nuts, chocolate) Stick to berries, melon, dairy, meats, and fats Avoid increased intake of oxalate precursors</p> <p>Oxalates are a byproduct of glycine, serine, hydroxyproline, and vitamin C metabolism Hydroxyproline is a structural AA important in collagen (marker of protein quality)</p> <p>Lipids Consider a low-fat diet, especially for dogs Hyperlipidemia, obesity, hx of pancreatitis</p>

Calcium Phosphate	Rarely occur as a primary stone “tag along” mineral		Can precipitate out with increasing pH (apatite) No dissolution protocol; if large component, may prevent struvite from dissolving
Struvite	Almost always associated with urease-producing bacteria (in dogs) *usually sterile in cats  Staphylococcus pseudintermedius Proteus mirabilis Klebsiella Pseudomonas Providencia	Urease-producing bacteria  Consider secondary UTIs for both species	Low in precursors: Protein, Phosphorus, Magnesium Acidifying Diluting Keep dogs on antibiotics Allow ad libitum or multiple feedings for cats, this may help decrease the post-prandial alkaline tide  USG should be dilute Urine pH should be acidic
Urate	Error in purine metabolism Genetic vs hepatic dysfunction Many dalmations have a genetic defect in the uric acid transporter (liver and kidney) Simple autosomal recessive trait, decreases hepatic conversion to allantoin and decreases proximal renal tubular reabsorption  Mutation in the SLC2A9 gene  Cat Breeds: Siamese, Egyptian Mau	Hyperuricosuric (HUU) Breed  Shunt	Precursors, pH, dilution  Reduce purine intake Low purine protein sources such as dairy, eggs, plants Avoid organ meat, seafood  Low total protein  Dilute, alkaline urine  Water, plant protein sources, +/- K citrate  Management in HUU Breeds Dissolution is usually not very effective Low purine diets based on ingredients
Cystine	4-7 years of age, most < 7y Genetic defects Mutation in SLC3A1 SLC7A9	Male intact dogs	Precursors, pH, dilution Diet low in protein (methionine, cystine precursors) Alkaline, dilute urine Same diets used for urate

	Androgen dependent Type III		
Silica	<p>Uncommon in dogs, not reported in cats</p> <p>Primarily larger, male dogs</p>	<p>Breeds: GSD, Labs, Goldens, Old English Sheepdog – Often older males</p>	<p>Role in diet is unclear</p> <p>Rule out dirt/sand consumption and water content</p> <p>People: Beer and supplements</p> <p>Older studies: high corn gluten feed, soybean hulls</p> <p>Plant breeding for drought tolerance &gt; more silica in plants</p> <p>Precursors, dilution (not pH responsive)</p> <p>Consider a diet low in carbohydrates (high in fat and protein) if tolerated</p> <p>Avoid high silica foods: Banana, dates, whole grains, pineapple, mango, legumes, spinach, beer</p> <p>Increase moisture intake</p>