data revealed an association with a variant of alanine--glyoxylate aminotransferase 2 (AGXT2) and 2-oxo arginine (0.45[a], 0.91[b], 1.26[c] for AA, AG and GG, respectively). In further analysis it became apparent that there was a significant difference in circulating betaine concentration between the genotypes (1.36[a], 1.24[a], 1.11[b] for AA, AG and GG, respectively). A subsequent study used 23 cats (n= 9, 4, 10 for AA, AG and GG, respectively) to evaluate change in stone risk as influenced by dietary inclusion of betaine (included at 0.5%), and botanicals (green tea, fenugreek and tulsi, included at 0.25, 0.025 and 0.0015%, respectively in a test food) compared with a control food without these additions.

Stone risk analysis was completed on urinary samples for struvite relative super saturation (sRSS) and a calcium oxalate titration test (COT). Urine was analyzed for sRSS using the EQUIL 2 program. In brief, this computer program calculates a urine supersaturation ratio (unitless) with respect to the common kidney stone components. The EQUIL 2 program provides an evaluation of the state of urinary saturation based on pH and total concentrations (M/L) of specific analytes. This study measured sodium, potassium, calcium, magnesium, chloride, ammonium, citrate, phosphate, sulfate, and oxalate concentrations. The method uses thermodynamic stability constants to calculate free ion activities for urinary ions. These free ion activities are then used to calculate the supersaturation ratio of urine compared with what would form crystals in pure water. The urine calcium oxalate titrimetric test (COT) was performed using a method whereby the $[Ca^{+2}]$/(added Ox^{-2}) ratio is calculated (per L). The ratio represents the concentration of ionized calcium and the amount of oxalate that is added to initiate crystallization. An increasing index value denotes samples at greater risk of calcium oxalate crystallization, whereas decreasing index values denotes those with lower risk. All cats were placed on a pre-trial food for 28 days and then assigned to either control or test food for 28 days. After 28 days food offerings were switched so that after 56 days every cat had eaten both foods for 28 days.

There was no change in sRSS with food. All mean values for sRSS were below 0.75 showing a very low risk for struvite stones. There was a significant genotype by food interaction with the control food COTT values (2.66, 2.75, 2.72 for AA, AG and GG, respectively). After consuming the test food, the COT values were 2.91, 2.39, 2.12 for AA, AG and GG, respectively. There was no influence of food on the COTT values for AA whereas the cats with the GG genotype had reduced values compared with either GG cats after consuming the control food or AA cats after consuming test food.

These data show that there is a genotype specific benefit for reducing the risk of calcium oxalate stones after feeding a betaine and botanical dietary enhancement.

NM09

Nutrient-Enriched Water Supplements Nutritionally Support Hydration in the Domestic Cat

Emma L. Wils-Plotz – Nestle Purina Pet Care; Brian Zanghi – Nestle Purina Pet Care

This study evaluated the effects of two similar nutrient-enriched water (NW) supplements that differ only in gum content, on water intake and urine measures of hydration of healthy cats. Domestic shorthair cats (N=36; mean age 5.1yrs±SE 0.36; BCS 5-7 on 9-point scale) were separated into three groups (N=12/group) and offered a liquid supplement dose twice daily in a bowl (third bowl option), with a total daily dose of 36ml/kg BW, for 14 days. The three treatment groups consisted of either tap-water (TW) or NW containing 1.2% whey protein and 1% glycerol with 0.11% gums (NW-A) or 1.1% gums (NW-B). Prior to the 14 day treatment period, a 7-d baseline established daily TW and food consumption with ad libitum TW and Pro-Plan Veterinary Diet UR cat dry food portion-fed twice daily to maintain body weight. During the treatment period, all cats always had ad-libitum access to TW. Blood samples were collected on days -1 and 14 for analysis of serum total protein, creatinine, and osmolality. Urine was collected and pooled over 48-hours using inert litter on days -3 to -1 and 12 to 14. Pooled urine samples were collected and analyzed for total protein, creatinine, osmolality (U_{osmo}), and urine specific gravity (USG). During the baseline period, tap-water intake, daily urine void volume, USG, and total protein, creatinine, and osmolality from urine and serum were not statistically different ($P > 0.05$) between groups. During the treatment period, both the NW-A and NW-B groups had an increase (P osmo, and USG were all significantly ($P < 0.0001$) decreased in cats consuming either the NW-A and NW-B treatments compared to those consuming TW. This study demonstrated that both of the nutrient-enriched water supplements, regardless of gum content and provided with ad libitum access to TW, can increase total daily liquid intake and significantly improve urine measures of hydration in healthy cats based on greater daily urine output and dilution.

NM10

Pharmacodynamic and Pharmacokinetic Analysis of an Oral Sulforaphane Source in Beagle Dogs

Stacy Ownby – Nutramax Laboratiories Veterinary Sciences, Inc; Grace Cornblatt – Nutramax Laboratories Veterinary Sciences, Inc; Carolyn Warner – Nutramax Laboratories Veterinary Sciences, Inc; Rebekah Strunk – Nutramax Laboratories Veterinary Sciences, Inc; Brian Cornblatt – Nutramax Laboratories Veterinary Sciences, Inc; Robert Gillette – Nutramax Laboratories Veterinary Sciences, Inc; David Griffin – Nutramax Laboratories Veterinary Sciences, Inc

Sulforaphane (SFN) is a phytochemical produced by the hydrolysis of its precursor glucoraphanin (GFN) by myrosinase (MYR) enzyme, both of which are found in cruciferous vegetables like broccoli. Sulforaphane has been shown to activate the NRF2 pathway which regulates the expression of detoxification and antioxidant proteins. Currently, SFN is being researched in human clinical trials for its cytoprotective properties in a variety of health indications. More recently, veterinary research on SFN is beginning to uncover health benefits for animals. Pharmacodynamic (PD) and pharmacokinetic (PK) studies of an oral GFN and MYR that supports sulforaphane production (Avmavet™ , Nutramax Laboratories Veterinary Sciences) were performed in beagle dogs. In an initial PK/PD study, four dogs were administered a tablet containing 15 mg of GFN and active MYR orally once a day for a three day period. PBMC RNA from blood samples collected at pre-treatment, 8 hours (hr), 24 hr, 48 hr, and 72 hr were processed for NQO1,