

Companion Animals Symposium: Nutrition Special Needs—The relationship between novel ingredients, environment and gene expression

61 Alternative ingredients: Which have scientific merit? G. Aldrich,* *Pet Food & Ingredient Technology Inc., Topeka, KS.*

As pet foods continue to address market and health concerns, and as the volume of pet food around the world continues to grow, pressure to develop alternative ingredients and to expand existing ingredient reservoirs escalates. Alternative ingredients are considered for several reasons. These include perceived biomedical value to support the expanding need for novel proteins and starches for so-called hypoallergenic or elimination diets. Regulatory limitations on claims regarding food benefits beyond simple sustenance leaves marketing little latitude short of drawing attention to ingredients as primary points of competitive differentiation. Finally, as consumer perception of certain traditional ingredients becomes less accepting there is an increased demand for more unique, humanized, and less chemical or agricultural sounding elements. Regardless of rationale, utilization of non-traditional, novel, or experimental ingredients as alternatives necessitates the exploration of safety, efficacy and utility for pet diets. Some of this work has been accomplished for the targeted species (dogs and cats) and in some cases validation with model species such as rats and mice is available. However, many of these alternative ingredients are being utilized with little animal or food quality evaluations. Some of these alternative ingredients can be quite exotic, but most are more mainstream alternative ingredients being used with enough frequency that a closer look is warranted. This list includes such items as rabbit and duck meals for lamb and chicken meal, potato and pea protein concentrates for soybean and corn gluten meal, pea fiber for beet pulp, chia for flax, sweet potato and tapioca for grains, algal oil for fish oil, olive oil and coconut oil for soybean or canola oils, cod liver oil for vitamins A and D, and chicken cartilage for glucosamine to name a few. This presentation will review the relevant published information for the more popular alternative ingredients and identify which have scientific merit.

Key Words: petfood, dog, cat

62 Benefits of probiotic supplementation in stressful situations in companion animals. M. R. Lappin,* *Department of Clinical Sciences, Colorado State University, Fort Collins.*

There are many products in the veterinary market purported to contain probiotics that exert a beneficial effect on dogs or cats. In humans, results of studies vary dramatically which emphasizes that biological effects of individual probiotics will vary and that each probiotic should be rigorously evaluated in a controlled fashion to define the potential for clinical utility. In addition, the source of the probiotic should also be considered as the majority of veterinary products claiming to contain probiotics generally do not meet the label claim. It is known that many probiotics in the lactic acid bacteria group help balance the endogenous gastrointestinal microbiota and some can inhibit replication of pathogenic bacteria. It is also now known that some probiotics can beneficially influence innate and acquired immunity systemically by a variety of proposed mechanisms including inducing cytokine production, natural killer cell activity, and both specific and non-specific immunoglobulin production. Recently, our laboratory completed 2 studies showing the beneficial effect of a probiotic (FortiFlora; Nestlé Purina PetCare) on animals in stressful situations. Feline herpesvirus 1 (FHV-1) infection of cats causes chronic respiratory and ocular infections that can be reactivated by stress in a similar fashion to human herpesvirus associated

cold sores. It was shown that cats supplemented daily with the probiotic developed less severe signs of FHV-1 associated illness during periods of stress when compared with the control group. Stress associated diarrhea is common in companion animals and is thought to result from changes in the gastrointestinal microbiota. When one cat room of an animal shelter was supplemented with the probiotic and the other room fed a placebo, it was shown that the proportions of housed cats with diarrhea of 2 d or greater was significantly lower in the treated group (20.7% versus 7.7%). In both of these stressful situations, it appears the use of the probiotic improved the health and wellbeing of the treated animals.

63 Dietary and environmental management of feline lower urinary tract disease (FLUTD). K. R. Kerr,* *University of Illinois, Urbana.*

Feline lower urinary tract disease (FLUTD) is a grouping of symptoms that affect the cat's lower urinary tract system and bladder; however, the clinical signs are rarely indicative of a particular disease. There are many conditions that can result in signs of FLUTD, including urolithiasis, cystitis, and urethral obstruction, but the vast majority of cases are idiopathic. Feline idiopathic cystitis (FIC) is seen in 50 to 65% of FLUTD cases. While cases of non-obstructive FLUTD are usually self-limiting, most cats have recurrence of clinical signs. Treatment is recommended to reduce recurrence because FIC is painful and distressing to the cat, can result in self-traumatization and behavioral changes. In cases that progress to obstructive disease, it could be fatal. The etiopathogenesis of FLUTD likely involves combinations of factors: locally present external factors within the urine, such as urine supersaturation, abnormalities in protective factors, or the presence of toxins and microorganisms; intrinsic abnormalities in the glycosaminoglycan (GAG) layer, the urothelium, or other urogenital morphology; and increased sensitivity or abnormal response to external or internal stimuli. Dietary impact and recommendations for decreasing recurrence of the most common types of urolithiasis based FLUTD have been available for many years. More recently, treatments that address additional contributing factors have arisen. The primary recommendations for FLUTD in general are to alleviate stress, and increase water intake. Multimodal environmental modification is one approach to alleviating stress that has been examined in regards to FLUTD. Supplemental GAGs are sometimes provided to potentially ameliorate abnormalities in the GAG layer. Until definitive cause for a FLUTD case can be identified and eliminated (if possible), environmental and dietary modifications will play a significant role in decreasing recurrence events.

Key Words: feline lower urinary tract disease (FLUTD)

64 Functional nutrition: Novel ingredients and new findings. I. S. Middelbos,* *Novus International Inc., St. Charles, MO.*

Human functional foods and beverages currently represent a multi-billion dollar market that is growing rapidly. These functional foods aim to deliver specific benefits beyond standard nutrition, based on the functional ingredients they contain. The continued premiumization of pet food, combined with the humanization of companion animals creates a strong drive to bring functional ingredients from the human market to pets. Indeed, many functional ingredients used in humans have application in companion animals. Two leading categories of functional

ingredients for both humans and companion animals relate to joint health and digestive health. In many instances, manifestations of joint or digestive conditions include pain and below-normal functionality of the joint or the digestive tract. When joints are affected, often this leads to decreased mobility and reduced motivation for physical activity, which may in turn contribute to other conditions (e.g., obesity). Currently, several ingredients are under investigation for their potential to support healthy joints. Many of these are food ingredients or co-products that were not previously considered to have specific functionality. Examples include green-lipped mussel and hydrolyzed eggshell membrane and chicken collagen. Digestive conditions may be uncomfortable for the pet as well as the pet owner, because of the resulting symptoms (e.g., diarrhea and flatulence). Whereas dietary fiber has been a mainstay to support a healthy digestive tract, the science is currently evolving to help us understand how specific fiber fractions and structures may affect certain digestive health conditions. Moreover, the field of probiotics continues to evolve with ever more targeted strains to address conditions along the entire digestive tract. The common thread among all these conditions is the immunological component involved. The most successful ingredients appear to be those that are able to negotiate some moderation in immune response. The field of functional ingredients is growing rapidly and has much potential to improve functional nutrition of both man and companion animal, provided the regulatory frameworks allow for this potential to come to fruition.

Key Words: companion animals, functional ingredients, functional foods

65 Nutrigenomics: Using gene expression data to understand and manage pet obesity. K. S. Swanson,* *University of Illinois, Urbana.*

Pet obesity is a major health problem, with an estimated 30 to 40% of dogs and cats considered as overweight or obese in the United States. Obesity is pleiotropic, resulting in altered adipose, liver, and skeletal muscle tissue function. These changes in tissue functionality lead to metabolic alterations (e.g., insulin resistance, hyperlipidemia), increase risk of chronic diseases, and decrease life span. Although obesity is well accepted as being unhealthy, the mechanisms by which the obese state leads to chronic disease are poorly understood. The use of transcriptomics, particularly whole genome microarrays and quantitative RT-PCR, has increased understanding of tissue biology and has begun to link mRNA changes to the physiological state. Companion animal biologists have applied these technologies to study adipose, skeletal muscle, and hepatic tissues of dogs and cats in many ways. Research has focused on lean vs. obese pets, pets rapidly gaining weight following spay/neuter or ad libitum feeding, pets undergoing weight loss, and obese pets fed specific dietary ingredients to improve metabolism or insulin sensitivity. The results of these studies and application to pet nutrition and management will be reviewed.

Key Words: pet obesity, transcriptomics, nutrition