

# George C. Fahey Companion Animal Nutrition Symposium I: Effect of Dietary Format on Nutrition, Food Management, and Food Safety

**60 Introduction—Defining natural pet foods.** K. R. Kerr\*, *Department of Animal Sciences and Division of Nutritional Sciences, University of Illinois, Urbana.*

Many pet owners are choosing alternative diets for their dogs and cats. Therefore, it is not surprising that more and more pet food packaging contains words like “holistic,” “natural,” “organic,” “real meat,” “no preservatives,” and a multitude of other claims. In 2009, it was estimated that 249 new natural products were available in the pet market, up from 154 new natural products in 2007. While the pet food market is benefiting from the current natural and organic trends, the definitions of these terms are either vague or misunderstood by consumers, allowing a multitude of products to be categorized and purchased under these terms. We have invited some of the field’s most reputable speakers, who have first-hand experience with researching, marketing, formulating, and managing the safety of natural pet foods.

**Key Words:** companion animal, nutrition

**61 From wild to captive diets: Metabolic flexibility of cats.** A. Verbrugghe\*, *Ontario Veterinary College, University of Guelph, Guelph, ON, Canada.*

The domestic cats’ wild ancestors (*Felis silvestris*) are known to be obligate carnivores, consuming prey which are high in protein, moderate in fat, and contain only minimal amounts of carbohydrates. Evolutionary events adapted the cat’s metabolism and physiology to this diet strictly composed of animal tissues, which led to unique digestive and metabolic peculiarities of protein, carbohydrate, fatty acid, and vitamin metabolism. Cats have a high protein requirement and are unable to adapt hepatic catabolic enzyme activity to a low protein diet. Cats also have a higher requirement for essential amino acids such as arginine, methionine, cysteine and taurine. Carbohydrate digestion is characterized by a very low salivary amylase activity, a rather low intestinal amylase activity and a non-adaptive sugar transport system across the intestinal brush border. Moreover, hepatic glucokinase and glycogen synthase activity are limited, while hepatic gluconeogenic enzymes are upregulated. The modern domestic cat (*Felis catus*) still closely resembles its wild ancestor. Although the carnivore connection of domestic cats is well recognized, little is known on the precise nutrient profile to which the digestive physiology and metabolism of the cat has adapted throughout evolution. Data from dietary habits of feral cats combined with compositional data of the consumed prey species revealed a typical diet containing a crude protein, crude fat and nitrogen-free extract content on dry matter basis of 63.1, 20.1 and 8.9%, respectively. Still a distinct difference must be made between the optimal diet composition and nutrient requirements. Also this diet composition did not discriminate between reproduction and maintenance nor accounted for disease or other physiological states. It can be argued that the shift from an obligatory meat based diet to a pet food with higher carbohydrates levels places the cats’ metabolism under stress and might have unwanted negative health effects in the long-term, especially when accompanied by a shift from an outdoor environment to an indoor lifestyle and a decreased physical activity.

**Key Words:** feline nutrition, metabolism

**62 What is natural? Marketing versus science of natural pet diets.** P. R. Buff\*, R. A. Carter, and J. H. Kersey, *The Nutro Company, Franklin, TN.*

In recent years, the natural segment of pet foods has grown steadily from \$2.0 billion in 2008 to \$3.9 billion in 2012. This growing trend may be attributed to anthropomorphism of dogs and cats as 63% of pet owners consider their pets to be family members. The term natural when used to describe pet foods or pet food ingredients has been defined by the Association of American Feed Control Officials (AAFCO). The regulation requires at a minimum the pet food is preserved with natural preservatives. However, pet owners consider natural as something different than the AAFCO definition. Pet owner perception of natural pet food is variable and includes the following; organic, less additives, no by-products, no added preservatives and high protein. Much of the trend in natural pet food focuses on ingredients with a rise in grain free, human grade and organic claims. However, the research behind the benefit of these natural ingredients may be lacking. Where evidence exists, some natural pet foods focus on structure-function claims to provide nutritional benefits linked to natural ingredients. New food formats have emerged in recent years, evolving from only extruded and canned diets to formats such as frozen, freeze-dried and baked. The processing of pet food can affect digestibility, nutrient bioavailability and safety. Some trends have focused on evolutionary diet formulation based on wild species. Domestic cats have been shown to prefer a macronutrient profile similar to wild cats. However, dogs prefer a diet different than wolves, with a macronutrient profile of approximately 30% of their caloric intake from protein. This may be attributed to recent data showing dogs have evolved much different than wolves in their ability to metabolize carbohydrates as dogs are scavengers rather than hunters. Future opportunities include the integration of sustainability with natural pet foods. The challenge is to match the consumer demand and provide natural nutrition to pets while reducing the impact on the environment. The market for natural pet food continues to grow as pet owners are becoming closer to their pets than previous generations and more aware of their pets’ diet.

**Key Words:** nutrition, natural, pet food

**63 Potential health benefits of phytochemicals in pets.** P. Nguyen\*<sup>1</sup>, B. Paragon<sup>2</sup>, H. Hazewinkel<sup>3</sup>, V. Leray<sup>1</sup>, G. Blanchard<sup>4</sup>, S. Serisier<sup>5</sup>, and A. André<sup>1</sup>, <sup>1</sup>National College of Veterinary Medicine, Food Science and Engineering Nantes-Atlantique (Oniris), Nantes, France, <sup>2</sup>National Veterinary School of Alfort, Maisons-Alfort, France, <sup>3</sup>Utrecht University, Utrecht, the Netherlands, <sup>4</sup>Animal Nutrition Expertise, Antony, France, <sup>5</sup>Royal Canin R & D, Aimargues, France.

In addition to the chemicals used as “usual” nutrients, plants contain secondary metabolites that are involved in adaptation to environment, defense against ‘predators’ and pathogens, and regulation of symbiosis and seed germination. These phytochemicals include phenolics, alkaloids, carotenoids, and organosulfur compounds. Although some are toxic when consumed, others may be associated with health benefits, including anti-mutation, anti-carcinogenesis, anti-oxidation and anti-angiogenesis properties. For the most part, their bioactive potency is low, but they may induce significant

effects when consumed daily over the long-term. Higher doses of phytochemicals can be provided in the form of nutraceuticals that are often phytochemical-enriched extracts or phytochemicals-like compounds synthesized and/or modified so that to increase their bioavailability and efficacy. The health effects of phytochemicals particularly concern age-related diseases, such as cardiovascular and neurodegenerative diseases, diabetes, osteoporosis, and several types of cancer. They have also been shown to improve obesity-related metabolic disturbances, especially low insulin sensitivity, and low-grade inflammation, as well as dyslipidemia. As phytochemicals are very numerous, several mechanisms of action can be involved, including the increase of the total antioxidant power, or modifications of gene transcription through activation of nuclear receptors or epigenetic modifications. For companion animals, less evidence is available as regards phytochemical efficacy than for humans and rodents from in vivo clinical and experimental trials, and in vitro studies. In pets, phytochemicals would improve insulin resistance, aging cognition impairment, osteoarthritis, carcinomas, urolithiasis, atopic dermatitis, and 'antioxidants' would improve immunological status. Some studies have concerned the bioavailability and tissue distribution of some phytochemicals but most often clinical studies are missing. It is known, however, that more is not always better. Moreover, we raise the question of how phytochemicals act, and that of the metabolic basis for 'dietary' supplementation of diets supposed to be balanced and meeting dietary 'requirements'.

**Key Words:** phenolic compound, carotenoids, plant secondary metabolite

**64 Ramifications of the food safety modernization act on the pet food industry, along with new technologies to control salmonella in pet food.** C. Knueven\*<sup>1</sup> and G. Aldrich<sup>2</sup>, <sup>1</sup>*Research and Development, Jones-Hamilton Co., Walbridge, OH*, <sup>2</sup>*Grain Science & Industry, Kansas State University, Manhattan*.

In 2007 there were 2 very significant food safety events in the pet food industry; one a chemical economic adulterant (melamine-cyanuric acid) and one a microbial pathogen (*Salmonella schwarzengurnd*). They each carried over into the human food chain and subsequently garnered enough attention of Congress to sweep pet food safety into the legislation crafted for the Food Safety Modernization Act of 2011. Since that time pet food manufacturers, equipment suppliers, laboratories, and ingredient suppliers have been gearing up for what they expect to be new rules regarding safety and traceability in the production of foods for companion animals. The new rules should be published by mid-summer 2013 and are expected to mirror the recently published cGMP rules for human foods. Diligence regarding testing has been expanding since 2007 with more than 99 recall events identified for various pet foods and treats during the period from 2008 to the present. While many of these events were due to mixing or labeling errors, the one large element generating great concern is the zero tolerance for pathogens such as Salmonella. For this there are several strategies being developed to bring contamination under control. This discussion will further discuss the requirements for facilities to conduct a hazard analysis, implement risk-based preventive controls, monitoring procedures, corrective actions, verification and recordkeeping steps to remain in compliance with the act. It will also provide an insight into new technologies and results from research on mitigation strategies for pathogen reduction and control and their influence on companion nutrition and food management.