NEWS AND VIEWS

Companion Animal Nutrition Symposia 2020 – A Review

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Introduction

For the 2020 ASAS-CSAS Annual Meeting held in Madison, WI the Companion Animal nutrition section had three symposia to address “Food fraud and food safety in companion animal foods”, “Feeding behavior and management”, and “Dairy ingredients and their application in pet food”. As pets moved from the barn into homes, pet parents pay closer attention to dietary strategies and feeding practices that may improve pet health and longevity. Food safety is a key component to support health of pet animals and humans since they share the same environment, including areas devoted for food preparation and storage. Another key aspect is the use of novel and functional ingredients to improve health, for example the use of dairy products. While the health benefits associated with consumption of dairy ingredients (i.e., whey, kefir, yogurt) are known for humans, there is a need for further evaluation of the nutritional adequacy and functionality of these ingredients for companion animals. Finally, humanization of pets may have impacted their lives more than we thought, as the number of overweight and obese animals are rising. We explored some of the issues related to how the food could be a factor in contributing with obesity and strategies to help pets to lose weight.

Food fraud and food safety in companion animal foods

Food fraud is the deliberate act of defrauding buyers of foods or ingredients for economic gain (Spink, 2019). While it is not fully known how widespread food fraud is, global food fraud may result in an annual cost of approximately US\$32

billion (EU Food Fraud Network). Several types of food fraud exist, including adulteration (most common), counterfeit product, simulation, tampering and theft. Multiple foods and ingredients have been associated with food fraud. A few examples include olive oil, fish, milk and dairy products, meat products, organic foods, and spices (Manning, 2016). Seafood is one of the most traded, and most challenging to accurately label, food commodities globally. Product mislabeling happens for a variety of reasons including species misidentification, use of inappropriate common names, incomplete and/or outdated regulatory frameworks, or market substitution (Shehata et al., 2019). Recently, DNA barcoding has been employed for seafood authentication, as a mislabeling rate of approximately 32% was observed and the authors suggested that a robust sequence library, development of new primers, and revision of regulatory framework are key to facilitate industry compliance and control seafood mislabeling (Shehata et al., 2019).

Food fraud is a pressing issue, not only because it poses a public health risk—as was the case in 2007 when melamine was added to high-protein feed and milk-based products—but also because it results in loss of trust of the entire food supply chain, which has lasting and costly consequences. Since the implementation of the Food Safety Modernization Act (FSMA) in 2011, improved food safety through prevention and mitigation of probability and severity of hazards has been a main goal of the U.S. Food Drug Administration (FDA). While not all types of food fraud are clearly addressed in current legislation, adulterated and misbranded food are described in the Food, Drug, and Cosmetics Act. In addition, title 21 of Code of Federal Regulation (CFR) parts 117.13 and 507.33 provide guidelines for hazard analysis that ensure safe manufacturing

of foods. Adoption of industry standards and guidelines developed by non-regulatory entities also can improve food safety and compliance. Specifically, in the pet food industry, the National Animal Supplement Council (NASC) has assisted companies in developing comprehensive quality assurance programs to implement quality controls and improve safety of pet supplements.

The use of biosensor and intelligent packaging has received renewed attention for improved food safety. Intelligent packaging uses internal and external indicators to monitor interactions between food, packaging, and environment (Biji et al., 2015). New packaging technologies will depend on the development of nanomaterials and nanoparticles. Use of biosensors enables the detection and analysis of molecules and has been applied in the food industry to improve shelf-life, quality, and safety of products (Fu et al., 2019). Intelligent packaging and nano-sensors will be pivotal in future food safety and security.

Feeding behavior and management

The increasing number of overweight and obese pets worldwide is concerning. While several factors may contribute to the onset of obesity, energy imbalance—meaning that pets consume more energy than expend—leads to an increase in body fat. Bermingham et al. (2014) proposed that the equations reported in the NRC (2006) overestimate the food allowance. Thus, there is a need to re-evaluate prediction equations to better reflect in-home vs. laboratory conditions. Once pets become obese, they can present other complications, such as chronic inflammation, joint issues, diabetes, and decreased lifespan (Kealy et al., 2002). Therefore, weight control is key to improve pet's life quality and longevity. Traditional weight management practices include some type of food intervention (smaller portions, low-calorie/reduced fat foods, or prescription diets) in addition to increase in exercise. However, the efficacy of these methods is somewhat reduced, as pet owners may not follow the regimen as required or even abandon it. Perhaps one novel alternative strategy for weight management is the reduction of methionine content of the diet (Forney et al., 2017); however, there is still a need to validate it for pets. For dietary intervention to be successful, the pets need to like the food, otherwise they will not eat it. Pet food companies traditionally evaluate their foods using the 2-bowl test using laboratory animals. Conversely, this test may not represent the preference of house pets, as the conditions of the procedure may not reflect the conditions at home (Griffin et al., 1984). While the pet's liking of the food may be related to its aroma, flavor, and texture, is the owner that has the first choice in food selection. Owners' preference may be influenced by price, brand, ingredients, processing, packaging, and availability, as well as the sensory attributes of the product. Finally, other factors may influence how much food and/or treats are provided to pets. Daily situations in owners' lives may impact the pet's behavior and increase the begging and/or overeating, thus leading to weight gain (Pretlow and Corbee, 2016). Possibly pet humanization is unbalanced towards unhealthy behaviors and a better understanding of pet manners is needed to prevent overeating and obesity.

Dairy ingredients and their application in pet food

Dairy ingredients are rich in protein and fat, contain bioactive components, and can serve technical and functional purposes

in diets for pets of all ages. Dairy ingredients are not widely fed to pets post-weaning due to concerns of lactose; however, with low lactose ingredients, scientists may be able to adapt human data regarding dairy ingredients to benefit pet health.

Whey proteins have multiple health benefits. Specifically, whey peptide and lactoferrin fractions appear to interfere with plaque formations in the brain associated with Alzheimer's disease. The peptide fraction has been observed to clear fibrils and prevent them from aggregating. Lactoferrin has demonstrated antimicrobial effects, preventing microbes and potentially even viruses from advancing Alzheimer's disease (Bharadwaj et al., 2013; Bennett et al., 2015). Additionally, whey proteins improve muscle mass accretion. As humans age, skeletal muscle mass decreases; this effect is exacerbated by lack of exercise. Whey proteins contain branched-chain amino acids which support muscle synthesis (Arentson-Lantz et al., 2019).

Dairy ingredients also may play a role in oral health. Lactoferrin and lactoperoxidase have been observed to modify the oral microbiome and odor components in humans. This is believed to be achieved through an antimicrobial effect of lactoferrin and lactoperoxidase, which modulates the odors which produced via fermentation (Nakano et al., 2019).

Milk fat globule membrane benefits cognitive development in human infants. Extensively studied in piglets a model for human infants, milk fat globule membrane can improve latency of decisions and number of correct choices based on visual cues. However, this benefit does not appear to continue long-term after consumption stops in infants, which may speak to the need for low-dose, longer term consumption (Mudd et al., 2016).

The microbial blend that comprise kefir can have probiotic-like effects in dogs. Dogs fed 200 g kefir/d consumed it well and negative effects were not observed. Additionally, gut microbiota was observed to be significantly modified in response to consuming kefir (Kim et al., 2019). Dairy ingredients can and should be further investigated, specifically in pets, to benefit pet health.

Thus, as pets moved inside homes and became part of the family, there are more concerns with their nutrition beyond nourishment, regarding the safety of the food, health benefits, and weight control to improve and strengthen the pet-human bond.

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