Investigative Diagnostic Toxicology and the Role of the Veterinarian in Pet Food–Related Outbreaks

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- Food-related illness • Pet food • Outbreak • Pet food recall
- Diagnostic testing

More than 90% of cats and dogs are being fed commercial pet food by their owners.[1] Even though some of these animals receive varying amounts of other food stuffs (eg, table scraps), more than 50% of their dietary intake is through consumption of commercial pet food products. However, more recently, some pet owners are electing to feed more noncommercial foods, such as home-prepared foods, to their companion animals.[1] This may be due in part to the occurrences of adulterated commercial pet food that have been widely reported in the media over the past several years. While the great majority of manufactured pet foods are safe, there have been a few instances in which chemical or bacterial contamination has caused outbreaks of illness in companion animals.

PET FOOD–RELATED OUTBREAKS AND RECALLS

Contaminants in pet food resulting in animal illness can be due to several factors, such as incorrect formulation of the nutritional components in the food, insufficiencies in analytical testing of food for toxins or toxicants, mixing errors during the production process, or incorporation of contaminated raw materials (eg, grains, meats, or other feed components) into the product. While industry quality control measures and voluntary recalls by pet food manufacturers usually preclude incidents of adverse health events in animals, there have been a few instances in which pet food contamination have occurred causing morbidity or mortality in dogs and cats. For

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example, in 2006 and 2010, mixing errors resulted in incorrect formulations of vitamin D in a pet food product. In the 2010 incident, the ingredient supplier for the pet food manufacturer produced a vitamin D supplement immediately prior to preparing ingredients for the pet food. Residual vitamin D in the manufacturing process carried over into the pet food ingredients causing cross-contamination of product. According to the US Food and Drug Administration (FDA), the 2010 recall resulted in 36 reported cases of nephrotoxicity nationwide.[2,3]

Adulteration of pet food products has also occurred due to contamination during general food processing. In 2006, *Salmonella enterica* serotype Schwarzengrund was responsible for widespread recalls of dry dog and cat food.[4] The number of affected animals in this outbreak, which was reported in 19 states, totaled 79. Contamination was thought to be due to the presence of the *Salmonella* strain in a flavoring room where the manufacturer sprayed the product to enhance palatability. Voluntary recalls due to suspect *Salmonella* contamination in pig ear products, pet treats, and canned or dry dog and cat food happen occasionally and are usually initiated before food-borne illness is reported.

Another example of pet food-related illness occurred in 2005 when approximately 19 varieties of dog food were recalled due to contamination with aflatoxin.[5] Animals in 23 states and 29 other countries to which the product was exported were affected. It was later discovered that corn and corn products contaminated with aflatoxin were inadvertently incorporated into commercial dog food. This error was likely due to the company not adhering to its own quality control guidelines for aflatoxin testing in shipments of corn to be used in the product.

Possibly the most notable pet food–related outbreak was the occurrence of renal failure in dogs and cats exposed to food adulterated with melamine and cyanuric acid. In 2007, there was a massive recall of melamine-contaminated pet food in the United States. In this incident, it was discovered that wheat and rice gluten incorporated into pet food was artificially contaminated with melamine and cyanuric acid in order to increase the apparent protein concentration of the product. Exposure to toxic amounts of these chemicals resulted in the formation of yellow-brown melamine-cyanuric acid crystals in renal tubules, resulting in proximal tubular epithelial necrosis and related nephrotoxicity in exposed cats and dogs.[6] More than 1000 commercial pet foods were recalled due to this adulteration.[7] Approximately 450 cases of renal failure were reported in cats and dogs, of which approximately 100 animals died.[7,8]

THE ROLE OF THE VETERINARIAN AND THE HUMAN ELEMENT

It is evident that the veterinarian plays a crucial role in recognizing these adverse events and the severity of animal health risk. While these occurrences have a tremendous impact on animal health, the veterinarian must also be cognizant of the potential human health risk. For example, human exposure to *Salmonella* Schwarzengrund–contaminated pet food (through handling) resulted in the first case of human salmonellosis linked to use of dry cat and dog food.[9] In this outbreak, 79 people were infected. Of these 79 people, 48% were children under the age of 2 years. This case emphasizes the importance of the veterinarian in educating households on the proper handling and storage of pet foods. It also underscores the need for veterinarians to have an awareness of potential human exposure in client households, in addition to being attentive to animal health.

Also highlighting the importance of the role of the veterinarian is the fact that animals can serve as sentinels for human exposure to toxins or toxicants. An example of this was underscored when nephrotoxicity had occurred in dogs and cats due to melamine-cyanuric acid–contaminated pet foods in 2007. Recognition of this pet