

TOP 5

Pet Food–Associated Illnesses

Cailin R. Heinze, VMD, MS, DACVN
Tufts University

A pet food–associated illness is any disease condition or illness associated with or caused by pet food. Infections and intoxications are most common, but nutrient deficiencies also occur. Pet food–associated illness is not limited to commercial diets; in fact, most cases of nutrient deficiency in pets result from the use of unbalanced home-prepared diets rather than commercial products. Infections and intoxications may be seen with both commercial and home-prepared diets.

While commercial pet food–associated illness is rare, many clients are concerned about the safety of commercial pet diets and may seek a veterinary consultation. It is thus imperative that veterinarians provide accurate information to clients regarding risks and recognize the more common pet food–associated illnesses they may see in practice.

1

Hypervitaminosis D

Vitamin D toxicosis has been a recurring cause of pet food–associated illness. This fat-soluble vitamin, activated in the body to form calcitriol, has a narrower safety margin than many nutrients.¹ Excessive vitamin D is typically introduced into commercial foods by formulation or production error.

Intoxication can also occur when diets with appropriate levels of vitamin D are supplemented exogenously with high levels of this nutrient, such as in some fish oil preparations, human vitamin and calcium supplements, and some commonly available pet supplements marketed for use with commercial diets. Rodenticides and commercial skin creams (eg, A+D ointment) may also contain high concentrations of vitamin D, and toxicity related to these products needs to be distinguished from food-associated hypervitaminosis.

Once activated in the body, vitamin D₃ (cholecalciferol) acts to increase calcium absorption in the gut and regulates bone mineral metabolism. Signs of toxicity include hypercalcemia, polyuria, polydipsia, and azotemia. In severe cases, dystrophic mineralization can precipitate acute kidney injury. Calcium-containing uroliths have also been reported anecdotally.

Intoxication can be confirmed by testing the diet for vitamin D metabolites (cholecalciferol and 25-hydroxycholecalciferol) and ruling out other causes of hypercalcemia. Elevations of 25-hydroxycholecalciferol can also be seen in the serum.

MORE ►

Top 5 Pet Food–Associated Illnesses

1. Hypervitaminosis D
2. Thiamine deficiency
3. Aflatoxicosis
4. Salmonellosis
5. Melamine poisoning

Although commercial pet food-associated illness is rare, many clients are concerned about the safety of pet diets and may seek a veterinary consultation.

Treatment involves removal of the dietary source of excess vitamin D and supportive care to treat hypercalcemia and any renal compromise. Some patients may recover initially but later develop chronic kidney disease.

2

Thiamine deficiency

Specific intake recommendations and standards for nutritional adequacy of commercial diets have reduced the risk for many essential nutrient deficiencies; however, thiamine deficiency remains an issue even in modern commercial diets.

Although reported in dogs and cats that receive complete and balanced dry diets, thiamine deficiency is largely seen in cats that eat predominantly home-cooked or canned diets (especially those labeled for intermittent and supplemental feeding only).

Compared with many other nutrients, thiamine tends to be heat labile and can be degraded with cooking. In addition, some diet ingredients contain thiaminases that can degrade the thiamine even without heat processing. Manufacturers typically add high enough amounts to the diet before cooking to compensate for expected losses; however, a recent study suggested that almost 1 in 6 canned cat diets may still contain inappropriately low amounts of thiamine.²

Thiamine deficiency, particularly in cats, often manifests with nonspecific signs of lethargy and anorexia followed by acute

neurologic signs that include ataxia, seizures, cervical ventroflexion, and eventually death.

Diagnosis is classically based on clinical signs, suggestive symmetric brain lesions on MRI, measurement of blood thiamine or RBC transketolase activity, and response to thiamine supplementation. In the absence of imaging or measurement of thiamine status, thiamine deficiency can be easily confused with other diseases and may not receive appropriate treatment in a timely manner.

If the deficiency is identified early enough, many patients respond quickly and completely to thiamine supplementation and dietary change, although some may have lingering neurologic deficits.

3

Aflatoxicosis

Aflatoxin is a mycotoxin produced by *Aspergillus flavus*, *A parasiticus*, and a few *Penicillium* species. While contamination of peanuts, soybeans, and most grains is possible, corn has been most commonly implicated in outbreaks of illness in small animals, which likely reflects the frequent use of corn in pet foods. Weather extremes (eg, drought, excess rain) can increase contamination of raw ingredients. Cats and dogs are more sensitive to this toxin than are many other animals (eg, sheep, chickens, rats).³

Aflatoxin is resistant to heat and normal food manufacturing techniques. The FDA has established a maximum level of 20 parts per billion (ppb) in human foods and pet diets, and manufacturers regularly test raw ingredients and finished diets.⁴ Past outbreaks have been attributed to quality control lapses at the manufacturer level. Aflatoxin was responsible for a number of small-scale regional recalls in 2011 and a number of more major disease outbreaks in the past 20 years.⁵

Clinical signs of aflatoxicosis include lethargy, vomiting, icterus, anorexia, and GI bleeding. Affected patients have marked liver enzyme elevations and may have evidence of fulminant hepatic failure.



Treatment is supportive, and mortality is high once clinical signs are seen (8/8 in one report,⁶ 46/72 in another⁷).

4

Salmonellosis

Pets fed raw or undercooked meat or eggs are most at risk for infection with *Salmonella* spp (and a number of other pathogens [*Campylobacter* spp, *Escherichia coli*]).⁸ There have also been multiple reports in the past 5 years of *Salmonella* spp contamination of dry foods leading to product recalls, although animal illness has not been associated with the majority of recalls. Whether the increased finding of *Salmonella* spp in dry pet foods is caused by greater surveillance versus greater contamination rates is unclear. Indeed, a recent study by the FDA showed that contamination rates in dry foods are still markedly lower than in raw pet foods (15/96 [15.6%] raw diets vs 1/480 [0.21%] dry diets).⁹

Dogs and cats with salmonellosis often present with mild to severe GI signs and may be febrile. Some cases can progress to septicemia. Without fecal culture, it can be difficult to distinguish *Salmonella* spp infection from the myriad of other causes of GI signs.

Even without showing clinical signs, dogs and cats with salmonellosis still can shed viable bacteria, possibly placing others (eg, humans) in contact with the patient or its environment at risk.¹⁰

5

Melamine poisoning

Melamine is a nitrogen-containing compound commonly used to make plastic dishes and tableware. Before the contamination of pet food, chocolate, and infant formula in 2007, it was thought to be inert and nontoxic.¹¹ Melamine was added to pet food via contaminated wheat flour from China in a rare case of purposeful, fraudulent adulteration of a food (not specifically to harm any animals or humans but rather for financial gain).¹²

The standard way to determine the protein content of food is to measure the total amount of nitrogen and then convert that

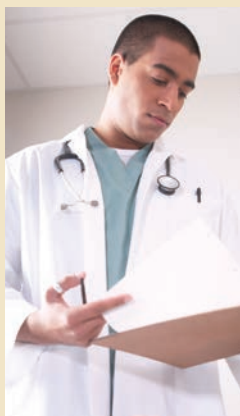
I suspect pet food–associated illness. What now?

The most important consideration is to ensure that the case is well documented with meticulous medical records and appropriate diagnostic testing. All deceased patients should be necropsied, ideally by a board-certified veterinary pathologist at a state or university laboratory. The client should be instructed to retain food packaging and purchase receipts, if available.

Samples of food (frozen for home-prepared diets, opened cans, or dry diets; room temperature for sealed cans), as well as frozen aliquots of body fluids (eg, whole blood, plasma, serum, urine), should be stored for future analysis. Tissue (eg, those normally sampled at necropsy; frozen and formalin fixed), should also be stored if available.

All suspected cases of commercial pet food–associated illness should be reported to:

- The FDA (safetyreporting.hhs.gov)
- AAFCO State Feed Control Official (aaftco.org/Directory/FindMembersbyState.aspx)
- Product manufacturer



amount to protein based on known ratios of nitrogen-protein in various foods. Because melamine is high in nitrogen, adding it to wheat flour allowed the flour to be passed off as high-protein wheat gluten, which commands a higher price than wheat flour.

Once ingested, melamine binds to uric acid and its own breakdown product (ie, cyanuric acid) and forms crystals that lodge in the kidney and can cause severe, potentially fatal kidney disease, particularly in cats.¹³ Melamine is now routinely screened for by many pet food manufacturers. ■ **cb**

See **Aids & Resources**, back page, for references & suggested reading.