



2020 Update: Nutrition and Dilated Cardiomyopathy—Latest Information, Historical Perspective, Next Avenues of Investigation

The US Food and Drug Administration first announced an investigation into reports of canine dilated cardiomyopathy “in dogs eating certain pet foods” in July 2018. The FDA released additional updates in February and June 2019, followed by a long gap in official updates—leaving room for significant speculation and drama that resulted in several sources declining interviews for this article.

Published Nov 30, 2020

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by Roxanne Hawn

THE US FOOD AND DRUG ADMINISTRATION (FDA) first announced an investigation into reports of canine dilated cardiomyopathy (DCM) “in dogs eating certain pet foods” in July 2018, including in “breeds of dogs not previously known to have a genetic predisposition to the disease.” The FDA released additional updates in February and June 2019, followed by a long gap in official updates—leaving room for significant speculation and drama that resulted in several sources declining interviews for this article.

The FDA and others finally presented some updates at an invite-only event hosted at Kansas State University in late September 2020. However, neither the FDA nor the university provided information from that event before press time.

Association, Not Causation Yet

Several researchers published a commentary in the *Journal of the American Veterinary Medical Association* in December 2018 entitled “Diet-Associated Dilated Cardiomyopathy in Dogs: What Do We Know?” At that time, they used careful language about the possibility of an association with diet and stated that “the apparent association may be spurious.”

When asked what has changed since then, one of the commentary’s coauthors, Joshua Stern, DVM, DACVIM (Cardiology), at the University of California, Davis, said, “Well, I think what’s changed to me is that research has continued in this area. Case numbers have continued to climb, and associations have been found now in multiple different environments/ research studies. And so I think the big thing that’s changed to me is this idea that this could just be spurious has kind of gone out the window. . . . I just don’t believe that it’s spurious anymore. I think it’s truly associated to diet. But the cause of that association, we don’t know, right? I’m not saying that it isn’t possible that the bags of these dog foods got contaminated by something in a warehouse and that it has nothing to do with the formulation. But I think the link here is the dog food. And we need to figure out why.”

Understanding why should narrow what’s currently a wide net of diets and diet commonalities. That wide net of brands and ingredients spurs frustration, even outrage, from manufacturers, retailers, and others. It also leaves veterinary practitioners at a loss about what to tell clients to avoid.

“I think it’s likely that not every diet that meets those characteristics is a high-risk diet,” Stern said, “but we don’t yet have a way to prioritize what diets are high or low risk within the group of diets that we consider to be suspect.”

According to *Pet Food in the US, Fifteenth Edition*, published by Packaged Facts in July 2020, “Given the shadow hanging over grain-free pet food, it’s not surprising to see an opportunistic swing back to grain-inclusive foods, including superpremium pet food recipes featuring grains.” The report also mentions that “the pendulum may also be swinging back to pet food formulations that are science-based and/or veterinary diets” and that “veterinarians are the most common impetus to pet food change, with 38% of dog owners and 31% of cat owners attributing veterinarian recommendation to a change in food.” This veterinary sway is not unique to DCM concerns. Prior editions of the report have documented veterinary influence in pet food choices in general.

Historical Perspective

Mark Kittleson, DVM, MA, PhD, DACVIM (Cardiology), is a professor emeritus of the Department of Medicine and Epidemiology at the University of California, Davis, and is a Veterinary Information Network consultant and editor. Kittleson was among the researchers who discovered the role of taurine deficiencies in DCM in both cats and dogs, going back to 1987. “It’s a recurring theme,” he said. “(1) DCM is found where it’s not expected, and (2) correcting the problem results in resolution or partial resolution of the DCM. So practitioners need to know this isn’t a new story but instead is an old story that is happening again.”

Other than cases in golden retrievers where low taurine may play a role, however, Kittleson says that “the problem doesn’t appear to be related to taurine deficiency.”

Another DCM researcher from those early days, Sherry Sanderson, DVM, PhD, DACVIM, DACVN, associate professor at the University of Georgia, followed dogs for longer than earlier studies and found that it takes longer for dogs to develop taurine deficiencies compared with cats and that diet could induce carnitine deficiencies that could cause DCM in dogs.

While Sanderson is not working on the current DCM situation, she described the differences and difficulties researchers face now: “First, in the 1990s, when we made the pet food company aware that we were seeing dogs developing DCM while consuming a specific diet, the pet food company did not deny that there was a problem. Instead, they invested more than \$500,000 into research to try to determine what was going on with their diet, and they corrected that problem once we discovered what the problem was. Second, there was no internet and social media back then for pet food companies and individuals to spread misinformation about what is going on or to harass us for doing research on this problem. Unfortunately, that is not the case today. Rather than applauding the research efforts of veterinarians working in this area, the researchers are facing harassment from some, which is unacceptable. Third, we were seeing the problem with a single diet, so it was easier to discover what was causing the problem. Currently, we are seeing dogs consuming certain types of diets from numerous pet food companies developing DCM, so it is more difficult to determine what is going on.”

Sanderson pointed to several key elements about the new crop of cases, including that the FDA reports cases where there is “more than one affected animal in the same household,” which she says may mean “genetics is

unlikely to be involved.”



Diet Descriptors as Noted in FDA Reports

A high proportion of all or some of these plant-based ingredients listed in the first 10 ingredients and before vitamins and minerals on the product labels' ingredient list:

- Peas
- Lentils
- Other legume seeds (pulses)
- Potatoes, including sweet potatoes, in various forms (whole, flour, protein)

Avenues of Investigation of Not Only What but Why

Heading into 2021, Stern remains hopeful research can move toward mechanistic evaluation so that “we can investigate in order to really get to the bottom of what’s happening because I think thus far, the industry and the research teams have been reactionary to this issue, and we really need to switch our footing from reactionary to be investigatory from a mechanistic standpoint.”

Relevant original research has been published in 2019 and 2020, including the following:

- [“Echocardiographic Phenotype of Canine Dilated Cardiomyopathy Differs Based on Diet Type,”](#) *Journal of Veterinary Cardiology* 21 (February 2019): 1–9.
 - **Conclusions:** “Dietary-associated DCM occurs with some grain-free diets and can improve with nutritional management, including diet change. The role of taurine supplementation, even without deficiency, is uncertain.”
- [“A Commercial Grain-Free Diet Does Not Decrease Plasma Amino Acids and Taurine Status but Increases Bile Acid Excretion When Fed to Labrador Retrievers,”](#) *Translational Animal Science* 4 (2020): 1–12.

- **Conclusions:** “These data suggest that feeding APS [Arcana Pork and Squash formula], a grain-free diet, over a 26-wk period improved taurine status in Labrador retrievers and is not the basis for the incidence of DCM for dogs fed APS. Other factors that may contribute to the etiology of DCM should be explored.”
- “Development of Plasma and Whole Blood Taurine Reference Ranges and Identification of Dietary Features Associated with Taurine Deficiency and Dilated Cardiomyopathy in Golden Retrievers: A Prospective, Observational Study,” PLOS ONE 15, no. 5 (May 15, 2020): e0233206.
 - **Conclusions:** “Nontraditional diets, which were typically grain free and contained legumes in this study were significantly associated and have increased relative risk for the identification of taurine deficiency and echocardiographic abnormalities consistent with nutritionally mediated DCM. These findings were identifiable in the absence of clinical signs and support the findings of previous studies and the ongoing FDA investigation.”

In addition, the 2020 American College of Veterinary Internal Medicine Forum On Demand featured these research reports and research abstracts relevant to nutritionally mediated DCM:

- “Use of Omics Technologies in the Investigation of Diet-Associated Dilated Cardiomyopathy in Dogs”
 - **Conclusions:** “Omics technologies (e.g., metabolomics, lipidomics) can provide functional information on individual diet constituents and blood biochemicals, and links can be compared between the two. This information may help to make mechanistic connections between diet and complex, multifactorial diseases, such as diet-associated DCM.”
- “Retrospective Investigation of Diet and Dilated Cardiomyopathy in Dogs”
 - **Key points of discussion, retrospective study (2014–2018):** “DCM cases increased over time. 79% of dogs with DCM [were] eating nontraditional diets. Dogs eating nontraditional diets that changed diet had some echo improvements and longer survival times than dogs [who] did not change diet.”
 - **Key points of discussion, case-control study (2018):** “Dogs with DCM (95%) are more likely to be eating nontraditional diets than dogs with MMVD [myxomatous mitral valve degeneration] (47%).”
- “Short-Term Outcome of a Prospective Study of Diet-Associated Dilated Cardiomyopathy in Dogs”
 - **Objective excerpt:** “To date, 41 of 42 dogs still alive were re-evaluated at 3 months (23 at 6 months, 16 at 9 months). . . . 3/9 traditional diet dogs were alive at 3 months. Overall, 27 dogs died or were euthanized [12/27 (44%) due to sudden death].”

Primary Versus Secondary DCM in Dogs

Sherry Sanderson, DVM, PhD, DACVIM, DACVN, said, “The big difference is primary DCM is a progressive disorder and almost always fatal, whereas secondary DCM has a chance to improve dramatically or reverse completely if the underlying cause is treated.”

Here’s of a chart she uses to explain the differences.

	Primary DCM	Secondary DCM

Etiology	Idiopathic, genetic, breed predisposition	Nutritional cardiomyopathy, toxic cardiomyopathy, end-stage myocarditis
Breeds	Doberman pinscher, Irish wolfhound, Great Dane, Newfoundland, Scottish deerhound, Afghan hound, Old English sheepdog, standard schnauzer, Portuguese water dog, American cocker spaniel, English cocker spaniel, toy Manchester terrier	Any breed, including breeds that develop primary dilated cardiomyopathy

In addition, *Trends* is aware of the following studies underway or planned:

- Investigation into diet-associated dilated cardiomyopathy in dogs –“prospectively screen a large population of apparently healthy dogs for DCM and compare important cardiac disease measures, including ultrasound of the heart, blood biomarker and taurine concentrations, and the frequency of DCM in dogs eating BEG [boutique, exotic, or grain-free] versus non-BEG diets”
 - University of Florida
 - Funded by the American Kennel Club Canine Health Foundation
 - Work anticipated through March 2021
- Investigation into the interaction between genetics (known and possible unknown markers) and nutrition in canine DCM cases—recruiting 1,000 DCM cases to “explore options for early detection of DCM, genetic risk factors for DCM (nutritional and nonnutritional), and potential solutions to support healthy recovery of affected dogs”
 - Funded by Hill’s Pet Nutrition and Embark Veterinary
 - Enrollment ongoing through early 2021
- Survey of DCM incidence and breed predisposition
 - BSM Clinical Nutrition Services
 - Funded by BSM Partners, LLC
 - Submitted for peer review, September 2020
 - [Prepublication data release](#)
- Effect of different diets on amino acid metabolism
 - BSM Clinical Nutrition Services
 - Funders not disclosed to *Trends*
 - Data analysis expected in spring 2021
- Neonatal metabolism
 - BSM Clinical Nutrition Services
 - Funders not disclosed to *Trends*
 - Project started in fall 2020
- Breed-specific nutritional requirements
 - BSM Clinical Nutrition Services
 - Funders not disclosed to *Trends*
 - Project started in fall 2020



“I think what’s changed to me is that research has continued in this area. Case numbers have continued to climb, and associations have been found now in multiple different environments/ research studies.” –Joshua Stern, DVM, DACVIM (Cardiology), University of California, Davis

Living with Unknowns

Veterinary practitioners and their teams continue to watch and wait, assess published data, consider relevant conflicts of interest, apply their own critical analysis, and decide how to engage with clients on this issue. “Probably the most important thing to know is that right now there are more questions than answers,” said Renee Streeter, DVM, DACVN, principal nutritionist with BSM Clinical Nutrition Services.

So prepare yourself for some level of unknowing, but that’s not new in veterinary medicine. Sanderson said, “It is possible that the current problem with dogs consuming certain types of diets developing secondary DCM is so complex and multifactorial that the underlying cause may never be found. That should not be a reason to do nothing about the problem.”

Sanderson compares it to how not all dogs develop acute renal failure after ingesting grapes or raisins. We don’t know why some do and some don’t. Yet nobody recommends that dogs eat grapes or raisins.

She also compares it to how not all cats develop vaccine-associated sarcomas. Yet, because enough cats were, the profession took action, including changing the location of feline vaccine administration.

In addition to the anticipated shift to mechanistic investigations, following nutritionally mediated DCM cases over a longer term may also reveal important details—about why these DCM cases develop, what happens over time, and what interventions help.