

Dogs Fed Grain-Free Kibble May Be at Risk for Heart Disease

Researchers have uncovered a connection between grain-free kibble, taurine deficiency and heart disease in certain breeds of dog. Here's what to do if you have a susceptible breed, are feeding grain-free kibble, or if your dog is showing signs of dilated cardiomyopathy.

Analysis by Dr. Karen Shaw Becker

STORY AT-A-GLANCE

- Veterinary researchers have uncovered a link between grain-free kibble, taurine deficiency and the heart disease called dilated cardiomyopathy (DCM) in certain breeds of dog
- It appears feeding grain-free/low-protein kibble to large dogs, especially predisposed breeds, increases their risk for taurine deficiency-related DCM
- The high starch/carb content of grain-free kibble, along with other ingredients and anti-nutrients in the formulas, as well as the manufacturing process used to produce dry pet food, depletes taurine levels and may inhibit a dog's ability to absorb and process the remaining taurine
- Until there is much more information on what is causing the uptick in taurine deficiency-related DCM in dogs, I recommend all dogs be supplemented with high-taurine foods, regardless of their current diet
- Pet parents concerned about their dog's heart health, especially owners of DCM-susceptible breeds eating grain-free kibble, should discuss their concerns with their veterinarian

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Thirty years ago, researchers at the School of Veterinary Medicine at University of California, Davis discovered the link between taurine deficiency and dilated cardiomyopathy (DCM), a heart muscle disease in cats.¹ According to Morris Animal Foundation, "The veterinary community was stunned" by this news, in part because the UC-Davis researchers were able to prove that DCM was reversible when cats received the amount of taurine they needed in their diet.²

Of course, most holistic veterinarians and others knowledgeable about veterinary nutrition and who understand the link between diet and disease weren't surprised. Taurine, which is an amino acid, is found in meat, and cats, as meat-eating obligate carnivores, haven't developed the ability to make their own taurine.

This means it's an essential amino acid for cats — they must get it from their diet, and 30 years ago when UC-Davis veterinarians made their discovery, we were well into the age of processed pet food, having made cats (and dogs) almost entirely dependent on humans for their nutrition.

Pet food formulators often guessed at the effects of extensive processing on nutrients. This is especially true for pet food (feed) that blends leftover pieces and parts from the human meat processing industry with other sources of questionable nutrients before they are rendered and cooked at high temperatures, depleting the nutrients that existed

before processing, as well as altering the chemical composition of ingredients (and often creating toxic byproducts along the way).

Are Dogs With DCM Taurine-Deficient?

As soon as the UC-Davis researchers published their findings in cats back in the late 1980s, veterinary cardiologists began looking for taurine and other nutrient deficiencies in their canine patients with DCM.

No direct cause-and-effect relationship could be established, since the vast majority of dogs with DCM weren't taurine-deficient. Taurine is not considered an essential amino acid for dogs because like many other species, their bodies have the metabolic capacity to manufacture taurine from the dietary amino acids cysteine and methionine.

To further confuse the issue, while the disease is inherited in certain breeds, for example, the Doberman Pinscher, in other breeds it is indeed linked to taurine deficiency. In the mid-1990s, UC-Davis conducted a study of American Cocker Spaniels with DCM and found low taurine levels in many of the dogs. The study authors wrote in their abstract:

*"We conclude that ACS [American Cocker Spaniels] with DCM are taurine-deficient and are responsive to taurine and carnitine supplementation. Whereas myocardial function did not return to normal in most dogs, it did improve enough to allow discontinuation of cardiovascular drug therapy and to maintain a normal quality of life for months to years."*³

A 2003 study showed that some Newfoundlands had taurine deficiency-related DCM,⁴ and two years later, another study was published about a family of Golden Retrievers with taurine deficiency and reversible DCM.⁵ As veterinary cardiologists continued to encounter cases of taurine deficiency-related DCM in dogs, and continued to search for a common link, diet was thought to play a major role in development of the disease.

UC-Davis Is Currently Conducting Research on Taurine Deficiency-Related DCM in Golden Retrievers

The dogs receiving the most focus right now due to escalating rates of DCM related to taurine deficiency are Golden Retrievers. Veterinarian and researcher Dr. Joshua Stern, Chair of the Department of (Veterinary) Cardiology at UC-Davis, and owner of a Golden Retriever Lifetime Study participant named Lira, is looking into the situation.

He's collecting blood samples and cardiac ultrasound results from Goldens both with DCM and without the disease. Stern agrees diet plays a role, but he also suspects there are genes at work that increase the risk of the condition in the breed.

*"I suspect that Golden Retrievers might have something in their genetic make-up that makes them less efficient at making taurine," Stern told the Morris Animal Foundation. "Couple that with certain diets, and you've given them a double hit. If you feed them a diet that has fewer building blocks for taurine or a food component that inhibits this synthesis, they pop up with DCM."*⁶

Dr. Stern has written an open letter to veterinarians and owners of Goldens that you can read [here](#). In it, he briefly explains his research and recommends a four-step process dog parents can undertake if they believe their pet is at risk for, or is showing signs of DCM:

1. If you believe your dog is at risk for taurine-deficient Dilated Cardiomyopathy (DCM) and wish to have taurine levels tested, please request a whole blood taurine level be submitted (lithium heparin tube) for analysis. The laboratory I recommend can be found [here](#).
2. If you believe your dog is showing signs of DCM already, please seek an appointment with a board-certified cardiologist to have an echocardiogram and taurine testing obtained simultaneously — do not change foods, do not supplement prior to the appointment.
3. If you receive taurine test results that come back as low, please seek an appointment with a board certified cardiologist to have an echocardiogram performed to determine if your pet needs cardiac medications and the appropriate supplements to be used (DO NOT SUPPLEMENT OR CHANGE FOODS UNTIL YOU HAVE THE CARDIOLOGY EVALUATION COMPLETED).

If you live in close to UC Davis, we can arrange research-funded cardiology evaluations for your dog if you contact at [this email address](#).

4. If you receive cardiologist-confirmed DCM results, please take an image of the food bag, ingredient list and lot number. Please also request a copy of the images from the echocardiogram from your cardiologist (ensure that you have full DICOM image copies on a CD). Please download and complete the full diet history form found at this [link](#).

Please email the image of food bag, a three-generation pedigree, diet history form, copies of the taurine level results and medical record to [this email address](#). A member of our laboratory team will contact you to discuss our thoughts and possibly request additional information, food samples or blood samples for further testing.

Stern wants to get to the bottom of this issue as fast and as medically appropriately as possible. He hopes to publish his initial findings soon and offer scientifically based guidelines for Golden parents regarding diet and DCM. If you're interested in published research on taurine deficiency and canine DCM, Stern also created a collection of files you can download at [this link](#).

A Particular Brand of Grain-Free Kibble Is Implicated in Some Cases of Diet-Related DCM in Goldens

Although Stern doesn't discuss specific diets in his letter linked above, according to Dr. Janet Olson of Veterinary Cardiology Specialists:

" ... [T]he majority of cases [of taurine deficiency-related DCM in Golden Retrievers] they [Stern and his team] are seeing at UC-Davis are from grain free diets that are high in legumes, like ACANA pork and squash [kibble]."⁷

Other sources, including a Golden Retriever owner in Mountain View, CA who contacted us, also mention the same food — ACANA Pork and Squash Singles Formula limited ingredient kibble made by Champion Petfoods. According to my Mountain View source, Dr. Stern has been following a group of Goldens with DCM who had been eating the ACANA formula, and a year later, after changes to their diet, taurine supplementation and in some cases, the use of heart medications, all 20+ dogs either fully or significantly recovered.

Consumers who've contacted Champion about the issue receive a response stating that taurine isn't an essential amino acid for dogs, and ACANA and ORIJEN diets are formulated to meet the nutritional levels established by the AAFCO dog food nutrient profiles for all life stages. (Since taurine isn't considered an essential amino acid for dogs, AAFCO dog food nutrient profiles establish no minimum requirement for taurine.)

Champion acknowledges that a taurine deficiency may contribute to the incidence of DCM in genetically susceptible dogs, but states their diets aren't formulated for dogs with "special needs."

Are All the Starchy Ingredients in Grain-Free Kibble to Blame?

Since grain-free dry dog food is a relatively new concept, it's quite possible there's something about the high-starch (carb) content in these diets that depletes taurine levels and/or makes the taurine less bioavailable. The problem might be related to a chemical reaction (called the **Maillard reaction**) between taurine and a carbohydrate during the extrusion process that depletes the digestible taurine level in the food.

And while legumes are being singled out as the potential problematic ingredient, grain-free kibble is often higher in both whole carbohydrates and purified starches (e.g., pea starch, potato starch and tapioca starch) than grain-based dry dog food. The higher the starch level in any pet food, the less protein is included.

In a study published in 1996 on the effect of high heat processing of cat food on taurine availability, the researchers noted, "These results suggest that Maillard reaction products promote an enteric flora that favors degradation of taurine and decreases recycling of taurine by the enterohepatic route."⁸

Said another way: The byproducts of the chemical reaction between amino acids and sugars (carbs) in dry cat food alter the microbiome (gut bacteria), causing degradation of the taurine in the food, reducing its availability to the cat, and also preventing the taurine from being efficiently recycled by the cat's body.

An earlier study published in 1990 that looked at taurine levels in a commercial diet that was fed heat-processed to some cats and frozen-preserved to others drew the same conclusion. The researchers stated "... processing affects the digestive and/or absorptive process in a manner that increases the catabolism of taurine by gastrointestinal microorganisms."⁹

Other Factors That Influence the Taurine Content of Pet Food/Feed

A 2003 study published in the Journal of Animal Physiology and Animal Nutrition looked at taurine concentrations in the ingredients often used in both home prepared and commercial pet diets, as well as how cooking influences taurine content.¹⁰

The researchers reported that animal muscle tissue, especially marine animals, contains high levels of taurine, whereas plant-based ingredients contained either low or undetectable amounts. Also, the amount of taurine that remains after cooking is somewhat dependent on the method of food preparation. When an ingredient was cooked in water (e.g., boiling or basting), more taurine was lost unless the water used to cook the food was included with the meal.

Food preparation that minimized water loss (e.g., baking or frying) retained more of the taurine, however, it's important to note that heat processing in any form destroys anywhere from 50% to 100% of taurine present in raw food. In addition, extended periods of storage of processed pet foods, and freezing, thawing and grinding of raw pet

food also depletes taurine content.¹¹

Another UC-Davis study published in 2016 evaluated the taurine status of large breed dogs fed low-protein diets (lamb and rice formulas), since they are now known to be at increased risk for taurine deficiency-related DCM.¹² The researchers specifically looked at the ingredients rice bran and beet pulp used in many of these diets, and determined that while rice bran didn't seem to be a primary cause of taurine deficiency, beet pulp may be a culprit.

Both rice bran and beet pulp bind bile acids (bile acids should be recycled, which effectively recycles taurine) in the small intestine, and increase excretion (which is undesirable) because it depletes taurine by interfering with the enterohepatic recycling of taurine-conjugated bile salts and lowers total body taurine levels.

Grain-free/"low-protein" commercial diets are very high in carbohydrates, which displace amino acids. They also contain anti-nutrients (e.g., saponins, trypsin inhibitors, phytates and lectins) that may interfere with taurine absorption. When you add in the high-heat processing used to manufacture kibble, it's hardly surprising these diets aren't an adequate source of taurine for many dogs.

How You Can Protect Your Dog

Those of us who are passionate about animal nutrition have been having a painful awakening for some time now about just how nutrient-deficient many dogs and cats are today. The taurine-DCM issue in dogs is yet another example that animals need much higher levels of bioavailable amino acids from a variety of sources than most are consuming.

Unfortunately, some processed pet food advocates are using the link between grain-free dog foods and DCM to try to push pet parents back in the direction of grain-based diets. Don't be fooled. The problem with grain-free formulas isn't the lack of grains! It's the high level of starchy carbohydrates coupled with the extreme high-heat processing methods used to produce these diets.

Until we have much more information on the subject, my current recommendation is to supplement all dogs with high-aurine foods, no matter what type of diet they're eating. An easy way to do this is to simply mix a can of sardines into your pet's meal once a week. You can also find the taurine content of many other foods on page two of **[this study](#)**, and also in this **[Raw Feeding Community article](#)**.

If you have a breed or breed mix known to be susceptible to DCM (e.g., Golden Retriever, Doberman Pinscher, Cocker Spaniel, Boxer, Great Dane, Scottish Deerhound, Irish Wolfhound, Saint Bernard, Afghan Hound, Dalmatian, Portuguese Water dog, Old English Sheepdog, Newfoundland), especially if you've been feeding grain-free kibble, or if for some other reason you're concerned about your dog's heart health, I recommend following Dr. Joshua Stern's four-step process outlined above, starting with a visit to your veterinarian.

Sources and References

¹ Tijdschr Diergeneeskd. 1989 Apr;114 Suppl 1:62S-64S

^{2,6} Morris Animal Foundation

³ Journal of Veterinary Internal Medicine, Vol. 11, Iss. 4, July 1997, pp 204-211

⁴ Journal of the American Veterinary Medical Association, October 15, 2003, Vol. 223, No. 8, Pages 1130-1136

⁵ Journal of the American Animal Hospital Association, 2005 Sep-Oct;41(5):284-91 Morris Animal Foundation

⁷ Veterinary Cardiology Specialists

⁸ Journal of Nutrition. 1996 Jan;126(1):195-201

⁹ [Journal of Nutrition, Volume 120, Issue 9, 1 September 1990, Pages 995-1000](#)

¹⁰ [Journal of Animal Physiology and Animal Nutrition, 87\(7-8\):251-62, September 2003](#)

¹¹ [Cats & Dogs Naturally](#)

¹² [Journal of Animal Science and Technology, 2016; 58: 29](#)
