



# FDA Investigation into Potential Link between Certain Diets and Canine Dilated Cardiomyopathy

February 19, 2019

In July 2018, the FDA announced ([/animal-veterinary/cvm-updates/fda-investigating-potential-connection-between-diet-and-cases-canine-heart-disease](#)) that it had begun investigating reports of canine dilated cardiomyopathy (DCM) in dogs eating certain pet foods containing a high proportion of peas, lentils, other legume seeds (pulses), and/or potatoes in various forms (whole, flour, protein, etc.) as main ingredients (listed within the first 10 ingredients in the ingredient list, before vitamins and minerals). Many of these case reports included breeds of dogs not previously known to have a genetic predisposition to the disease. The FDA's Center for Veterinary Medicine (CVM) and the Veterinary Laboratory Investigation and Response Network (Vet-LIRN), a collaboration of government and veterinary diagnostic laboratories, continue to investigate this potential association. Based on the data collected and analyzed thus far, the agency believes that the potential association between diet and DCM in dogs is a complex scientific issue that may involve multiple factors.

We understand the concern that pet owners have about these reports: the illnesses can be severe, even fatal, and many cases report eating "grain-free" labeled pet food. The FDA is using multiple science-based investigative tools as it strives to learn more about the evolution of this outbreak of DCM and its potential link to certain diets or ingredients.

This update does not include reports received in December and January due to the lapse in appropriations from December 22, 2018, to January 25, 2019. Because the Anti-Deficiency Act does not except activities that are solely related to protecting “animal health,” FDA was not able to continue its investigation during that time.

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## Cases Reported to FDA

For the purposes of this investigation, the FDA defines a “case” as an illness reported to FDA involving a dog or cat that includes a diagnosis of DCM. Many of the reports submitted to the FDA included very supportive clinical information, including echocardiogram results, cardiology/veterinary records, and detailed diet histories. The numbers below only include reports in which a veterinarian made a formal diagnosis of DCM. We did not include, in these numbers, the many general cardiac reports submitted to the FDA that did not have a DCM diagnosis. This case information is still valuable, as it may show heart changes that occur before a dog develops full-blown DCM. (Please see the Vet-LIRN DCM Update (</animal-veterinary/science-research/vet-lirn-update-investigation->

dilated-cardiomyopathy) for more technical information on the reported cases, including those without a formal diagnosis of DCM).

Between January 1, 2014 and November 30, 2018, the FDA received 300 reports of DCM (294 canine reports, 6 feline reports). Approximately 276 of these were reported after the July public notification about FDA's investigation (273 canine reports, 3 feline reports). Some of these reports involved more than one affected animal from the same household. The breakdown of reported illnesses below reflects the number of individual animals affected.

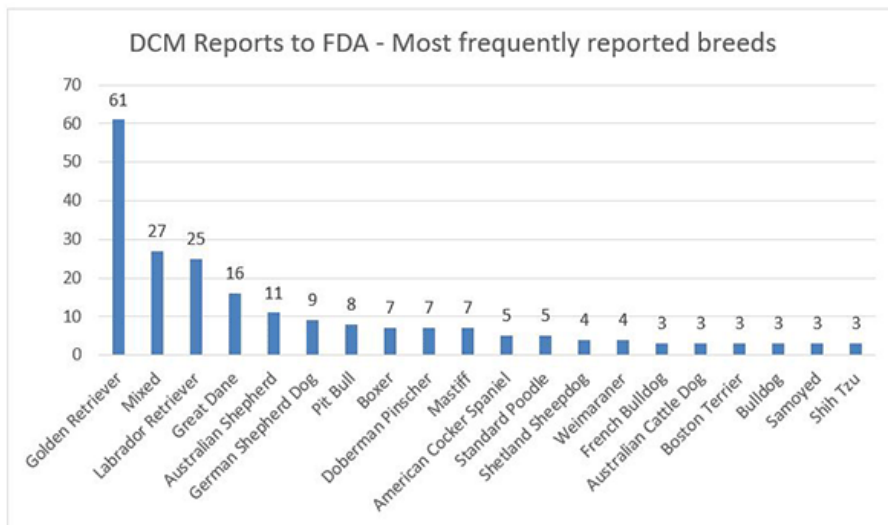
## **Animal numbers in DCM Reports received between January 1, 2014 and November 30, 2018**

	<b>Number of reactions</b>	<b>Number of deaths</b>
<b>Dogs</b>	325	74
<b>Cats*</b>	10	2

\*Cats are generally more likely to develop hypertrophic cardiomyopathy (a heart disease)

Dilated cardiomyopathy is recognized as a genetic condition in dogs, typically in large or giant breeds, such as the Doberman Pinscher, Great Dane, or the Irish Wolfhound. It is also seen in Cocker Spaniels. It is believed to be less common in small and medium breed dogs. We suspect that cases are underreported because animals are typically treated symptomatically, and testing and treatment can be complex and costly to owners. Because the occurrence of different diseases in dogs and cats is not routinely tracked and there is no widespread surveillance system like the

Centers for Disease Control has for human health, we do not have a measure of the occurrence of disease apart from what is reported to the FDA.



Additional breeds with more than one report include Afghan Hound, Beagle, Dalmatian, English Springer Spaniel, Flat-coated Retriever, Hound (unspecified), Maltese, Miniature Schnauzer, Pomeranian, Portuguese Water Dog, Pug, Retriever (unspecified), Rhodesian Ridgeback, Rottweiler, Saluki, Vizsla, and Yorkshire Terrier.

Genetic forms of DCM tend to affect male large and giant breed dogs starting in middle to older age. DCM cases reported to FDA CVM have involved a wide range of dog breeds, ages and weights. There have been a greater proportion of males than females, consistent with what is seen in genetic forms. The significance of this is unknown, but it may be that some cases are genetic in origin or a combination of diet and genetic tendencies.

**Table 1: Mean Age and Weight - DCM Cases in Dogs Reported to FDA-CVM**

Dogs	Mean	Range
Age (years)	6.5	0.42-16

Weight (lbs)	68	8-212
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### Table 2: Mean Age and Weight - DCM Cases in Cats Reported to FDA-CVM

Cats	Mean	Range
Age (years)	5.5	0.4-12
Weight (lbs)	11	7-13

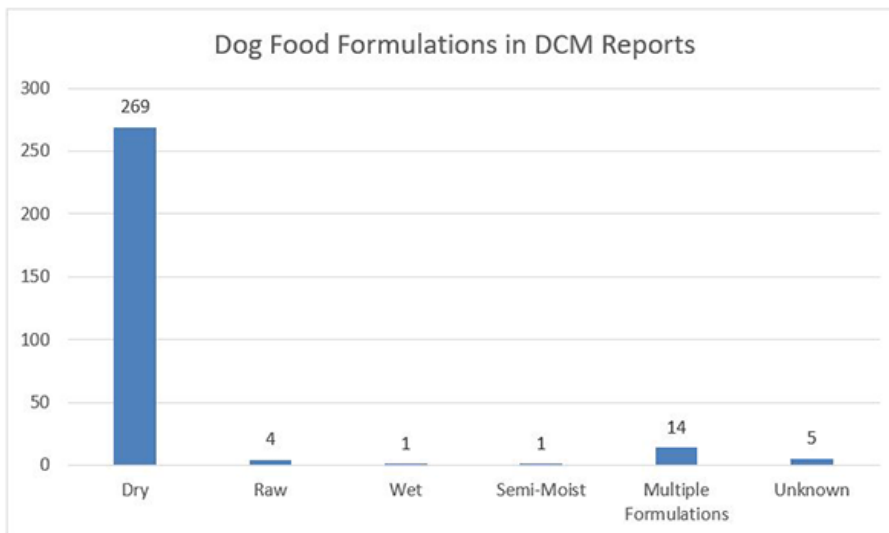
### Table 3: Sex of DCM cases reported to FDA-CVM by species (%)

Sex (%of cases)	Male	Female
Dogs	59	41
Cats	60	40

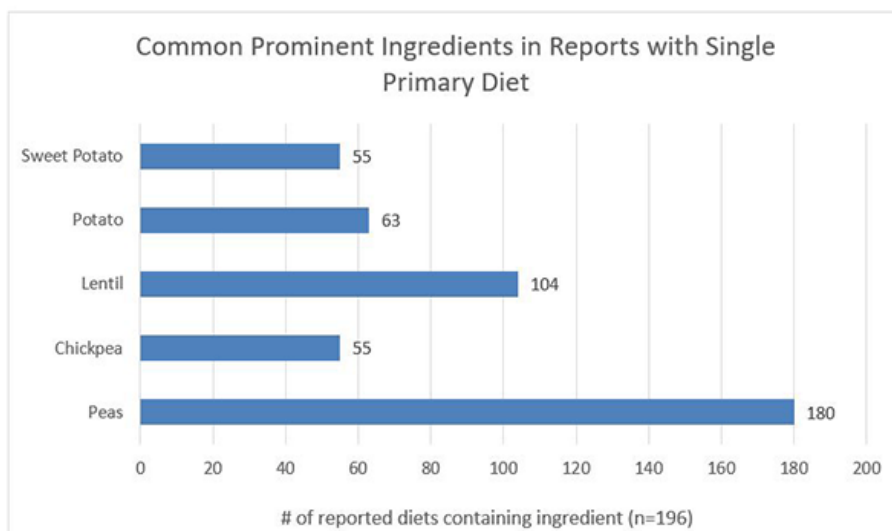
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## Diet Information from Reported Cases

Review of the canine reports shows that the majority of reports were for dry dog food formulations, but raw food, semi-moist food, and wet food were also represented.



Based on analysis of the 196 DCM reports to FDA in which dogs were fed only a single, primary diet (i.e., didn't eat multiple food products, excluding treats), approximately 90 percent of the foods were reported to be labeled “grain-free” (or labeled as zero-grain) and approximately 10 percent ate diets containing grains, some of which were vegan or vegetarian. A large proportion of the reported diets in DCM cases contained peas and/or lentils.



Animal protein sources in the reported diets varied widely. Of the 191 reports with a single primary diet that contained animal protein (rather than being vegan/vegetarian), 31 percent contained more than one animal protein source. The

majority of diets containing animal protein included fish, eggs, lamb or chicken. No one animal protein source was predominant.

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## Product Testing

Before the July 2018 DCM Update, FDA/Vet-LIRN had tested multiple products for minerals and metals (Ca, Mg, P, Fe, Co, Cu, Zn, Se, I) and amino acids including taurine, cysteine, and methionine. That product testing did not reveal any abnormalities.

Since the July 2018 DCM Update, Vet-LIRN tested both grain-free labeled and grain-containing products for the following:

- protein, fat, moisture
- crude fiber, total dietary fiber, soluble fiber, insoluble fiber
- total starch, resistant starch
- cystine, methionine, and taurine

The average percent protein, fat, total taurine, total cystine, total methionine, total methionine-cystine, and resistant starch content on a dry matter basis (in other words, after removing all moisture content) were similar for both grain-free labeled and grain-containing products. For more details, please see the Vet-LIRN DCM Update (</animal-veterinary/science-research/vet-lirn-update-investigation-dilated-cardiomyopathy>).

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## Taurine & Amino Acids

Nutritional research indicates that taurine is generally not considered an essential amino acid for dogs because they can synthesize taurine from cysteine and methionine. Nearly all of the grain-free products had methionine-cystine values above the minimum nutritional requirement of 0.65 percent for adult maintenance food for dogs published in the AAFCO Official Publication (OP).

The FDA is still gathering information in order to better understand if (and how) taurine metabolism (both absorption and excretion) may have a role in these reports of canine dilated cardiomyopathy.

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## **Diagnostic Testing – Vet-LIRN**

Vet-LIRN has interviewed 85 owners of affected dogs and cats to document the pets' complete dietary history and to explore any other factors that could have potentially contributed to development of DCM, such as environmental factors like heavy metal exposure or poisonous plant ingestion.

In addition, Vet-LIRN has contracted with a network lab to collect blood (whole blood and plasma), urine, feces, and DNA from dogs without a known breed predisposition to DCM (as a point of comparison) and to send to Vet-LIRN for testing.

Vet-LIRN has reviewed results of 15 gross necropsies from dogs with suspected heart disease, including ten necropsies that Vet-LIRN coordinated from cases reported through the FDA Safety Reporting Portal. The gross necropsies were performed by either veterinarians or veterinary pathologists,



and Vet-LIRN is currently processing the tissues for histopathology. A board certified veterinary pathologist will review the histopathology slides.

## **Golden Retrievers**

Past publications and research suggest that Golden Retrievers may be genetically predisposed to taurine deficiency, which is well-documented as potentially leading to DCM.

Veterinary cardiologist Dr. Joshua Stern from the University of California at Davis has been studying the rise in cases of DCM in Golden Retrievers, including a potential dietary link. Many cases of DCM in Golden Retrievers are taurine-deficient. Pet owners who suspect their Golden Retrievers may be affected may wish to consult their veterinarian to discuss checking taurine levels or conducting an echocardiogram.

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## **Collaboration**

When unprecedented events such as these occur, the FDA often consults with stakeholders across the animal health community to help fill any knowledge gaps that may help inform its investigation. These collaborations can help provide pieces to complete the puzzle and allow us to gain a better understanding of what happened.

## **Veterinary Community**

FDA veterinarians have been working with the veterinary community to exchange information about existing cases and the type of clinical information that is most helpful to the investigation. We are also consulting with a cadre of

board-certified veterinary cardiologists and nutritionists to learn more about the presentation of these cases and how they respond to treatment.

Chesapeake Veterinary Cardiology Associates (CVCA), a multi-location veterinary cardiology practice based predominantly in the Mid-Atlantic states, has provided comprehensive records for some DCM cases (including medical records, owner interviews, and diagnostic samples from pets with DCM diagnosed with an echocardiogram by a board-certified cardiologist) to the Vet-LIRN network for further testing. These case records include imaging studies of the animal's hearts, comprehensive dietary histories, diagnostic and treatment records, as well as outcomes of the cases.

FDA veterinarians have been working with Drs. Lisa Freeman of Tufts University, Joshua Stern of UC Davis and Darcy Adin of the University of Florida to learn more about their research findings and the cases they've encountered. The three were contributing authors to a paper published in Journal of American Veterinary Medical Association in December 2018, "Diet-associated dilated cardiomyopathy in dogs: what do we know?"

(<https://avmajournals.avma.org/doi/full/10.2460/javma.253.11.1390>)

[↗ \(http://www.fda.gov/about-fda/website-policies/website-disclaimer\)](http://www.fda.gov/about-fda/website-policies/website-disclaimer)"

## **Pet Owners**

As animal lovers and pet owners, FDA employees understand that the sudden onset of a life-threatening disease in a previously healthy pet can be devastating. The FDA is incredibly grateful to those pet owners who have agreed to be interviewed and given permission for their veterinarians to share medical records and diagnostic

samples, including blood, serum and tissue. The agency is especially appreciative when pet owners make the difficult decision to provide tissues for analysis when a beloved pet passes away. The FDA believes that the information gained will help the FDA to understand the specific changes that are happening in the cardiovascular system and how they may relate to diet.

## **Industry**

Another puzzling aspect of the recent spike in DCM cases is that they have occurred just in the last few years. The FDA is working with the pet food industry to better understand whether changes in ingredients, ingredient sourcing, processing or formulation may have contributed to the development of DCM.

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## **What you can do**

The FDA is open to additional opportunities for collaboration and welcomes the submission of any information that may aid in our investigation. Detailed instructions for submitting case information can be found on [“How to Report a Pet Food Complaint \(/animal-veterinary/report-problem/how-report-pet-food-complaint\).”](#)

## **Pet Owners**

If a dog is showing possible signs of DCM or other heart conditions, including decreased energy, cough, difficulty breathing and episodes of collapse, you should contact your veterinarian as soon as possible. If the symptoms are severe and your veterinarian is not available, you may need to seek

emergency veterinary care. Your veterinarian may ask you for a thorough dietary history, including all the foods (including treats) the dog has eaten.

## **Veterinarians**

CVM encourages veterinary professionals to report well-documented cases of DCM in dogs suspected of having a link to diet by using the electronic Safety Reporting Portal (<http://www.safetyreporting.hhs.gov/>) or calling their state's FDA Consumer Complaint Coordinators (</safety/report-problem/consumer-complaint-coordinators>). The more information you are able to provide, particularly about feeding history, medical records, and diagnostic testing, the better. Detailed instructions can be found on "How to Report a Pet Food Complaint (</animal-veterinary/report-problem/how-report-pet-food-complaint>)." Technical veterinary information that may aid veterinarians can be found in our Vet-LIRN Update - February 2019 (</animal-veterinary/science-research/vet-lirn-update-investigation-dilated-cardiomyopathy>).

## **Industry**


The FDA looks to industry organizations and pet food manufacturers to continue their own investigations to help shed light on potential issues with formulas or ingredients.

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## **What's Next**

The FDA is continuing to investigate and gather more information in an effort to identify the specific dietary link to development of DCM and will provide updates to the public as information develops.

## Additional Information

- FDA Provides Update on Investigation into Potential Connection Between Diet and Cases of Canine Heart Disease (</animal-veterinary/cvm-updates/fda-provides-update-investigation-potential-connection-between-certain-diets-and-cases-canine-heart>) (February 2019)
- Vet-LIRN Update (</animal-veterinary/science-research/vet-lirn-update-investigation-dilated-cardiomyopathy>) (February 2019)
- FDA Investigating Potential Connection Between Diet and Cases of Canine Heart Disease (</animal-veterinary/cvm-updates/fda-investigating-potential-connection-between-diet-and-cases-canine-heart-disease>) (July 2018)
- Journal of American Veterinary Medical Association - Diet-associated dilated cardiomyopathy in dogs: what do we know?  
(<https://avmajournals.avma.org/doi/full/10.2460/javma.253.11.1390>)  
 (<http://www.fda.gov/about-fda/website-policies/website-disclaimer>) (December 2018)

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