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29TH JUL 2018 | 5 NOTES

## DODDS RESPONDS TO FDA STATEMENT ON CANINE HEART DISEASE, TAURINE DEFICIENCY AND POTENTIAL DIETARY CAUSES



**Dodds Responds to  
FDA Statement on  
Canine Heart Disease,  
Taurine Deficiency  
and Potential Dietary Causes**

**Hemopet**

The Food and Drug Administration (FDA) released a statement on July 12, 2018 that it is investigating a possible connection between grain-free diets and dilated cardiomyopathy (DCM), which is also known as canine heart disease (CHD).

We address the FDA's statement later in this article and provide our commentary. First, we must consider the many factors that need to be accounted for in this situation:

- Genetics
- Diet
- Scientific research thus far
- Taurine requirements for dogs
- The interaction between foods when passing through the body

- The interaction between foods and the body itself

Researchers are only beginning to scratch the surface on the last two factors for human and animal nutrition. Yes; nutritional knowledge has been increasing dramatically over the past century, but this latest contention that grain-free foods may be associated with some adverse effects on the heart just highlights how little we actually know and understand.

## Overview

- Taurine is an amino acid.
- Amino acids are found in animal-based protein sources and plant sources like soy at varying amounts, depending on the type of meat or plant.
- Taurine deficiency can lead to heart disease in humans, cats and dogs.
- All breeds and sizes of dogs can develop CHD. However, CHD is more common in larger and giant breeds such as Great Danes, Boxers, Newfoundlands, Irish Wolfhounds, Saint Bernards and Doberman Pinschers. American and English Cocker Spaniels also have a higher incidence.
- The FDA reported that these new cases included Golden and Labrador Retrievers, Whippets, a Shih Tzu, a Bulldog, Miniature Schnauzers, and mixed breeds.
- At this time, taurine is **not** considered an essential, food-sourced amino acid for dogs. Taurine is synthesized in the liver from the amino acids cysteine and methionine, which should provide sufficient quantities to meet dogs' metabolic needs.
- Taurine can still be and is present in dog food. However, a pet food label does not need to reflect this presence or meet any minimum requirement per the Association of American Feed Control Officials (AAFCO).
- Cats, however, **do** have a need for food-sourced taurine to prevent heart disease; and AAFCO does have a minimum requirement amount for cat food.
- Whether cooking adversely affects or significantly degrades amino acid levels in foods is debated as relatively little is proven due to the variables identified in the published research.
- A study by Spitze *et al.* found, "The amount of taurine that remained in a feed ingredient after cooking depended upon the method of food preparation. When an ingredient was constantly surrounded by water during the cooking process, such as in boiling or basting, more taurine was lost. Food preparation methods that minimized water loss, such as baking or frying, had higher rates of taurine retention."
- Remember, cysteine is one the essential amino acids that dogs need to form taurine. A study by Weiss *et al.* concluded, "Eight (including cysteine) of the 20 standard amino acids decompose at well-defined, characteristic temperatures, in contrast to commonly accepted knowledge. Products of decomposition are simple. The novel quantitative results emphasize the impact of water and cyclic condensates with peptide bonds and put constraints on hypotheses of the origin, state and stability of amino acids in the range between 200 °C and 300 °C." Put simply, high temperatures do cause the breakdown or change these amino acids, including cysteine.

## Confluence of Foods

**No research has been conducted yet to determine if grain-free diets could cause heart disease in dogs.**

Below, we have abbreviated a few of the previous studies conducted on potential dietary causes of CHD:

### **Plasma and whole blood taurine in normal dogs of varying size fed commercially prepared food**

Delaney *et al.*, June 2003

- 131 normal dogs consuming commercially prepared dog food had blood drawn 3-5 hours post-meal to be analyzed for plasma amino acids and whole blood taurine.
- No effect of age, sex, body weight, body size, or diet was seen on plasma and whole blood taurine concentrations.
- Mean whole blood taurine concentrations were lower in dogs fed diets containing whole grain rice, rice bran or barley.
- The lowest whole blood concentrations were seen in dogs fed lamb or lamb meal and rice diets.
- Plasma methionine and cysteine concentrations were lower in dogs fed diets with animal meals or turkey, and whole grain rice, rice bran or barley.

### **Taurine deficiency in Newfoundlands fed commercially available complete and balanced diets**

Backus, *et al.*, October 2003

- Objective: To determine taurine status in a large group of Newfoundlands related by environment, diet, or breeding to a dog with dilated cardiomyopathy and taurine deficiency.
- Animals: 19 privately owned Newfoundlands between 5 months and 11.5 years old that had been fed commercial dry diets meeting established nutrient recommendations.
- Procedure: Diet histories were obtained, and blood, plasma, and urine taurine concentrations and plasma methionine and cysteine concentrations were measured. In 8 dogs, taurine concentrations were measured before and after supplementation with methionine for 30 days. Ophthalmic examinations were performed in 16 dogs; echocardiography was performed in 6 dogs that were taurine deficient.
- Results: Twelve dogs were considered taurine deficient. For dogs with these low plasma concentrations of taurine, there was a significant linear correlation between plasma and blood taurine concentrations. For dogs with greater taurine plasma concentrations, blood taurine concentrations did not vary substantially. Taurine-deficient dogs had been fed lamb meal and rice diets. Retinal degeneration, dilated cardiomyopathy, and cystinuria were not found in any dog examined for these conditions. The taurine deficiency was reversed by a change in diet or methionine supplementation.
- Conclusions and clinical relevance: Results indicate a high prevalence of taurine deficiency among an environmentally and genetically related cohort of Newfoundlands fed apparently complete and balanced diets. Blood taurine concentrations indicative of taurine deficiency in Newfoundlands may be substantially less than concentrations indicative of a deficiency in cats.

### **Low Plasma Taurine Concentration in Newfoundland Dogs is Associated with Low Plasma Methionine and Cyst(e)ine Concentrations and Low Taurine Synthesis**

Backus *et al.*, 2006

Backus and his team of researchers expanded the 2003 prospective study.

- Compared 216 privately owned Newfoundlands to Beagles.
- All dogs were fed the same kibble that consisted of lamb meal & rice. The abbreviated top ingredients were lamb meal, brown rice, ground rice, rice bran, chicken fat (preserved with mixed tocopherols and ascorbic acid), flax seed, dehydrated alfalfa meal, dried egg product, avocado oil, lecithin, and brewers dried yeast. Note: beet pulp was not listed as an ingredient.
- Based on current knowledge (2006) of taurine metabolism, diet-induced taurine deficiency has several possible causes including: 1) insufficient synthesis of taurine; 2) extraordinary loss of taurine or its precursors in urine; 3) accelerated gastrointestinal loss of taurine in bile acid conjugates; and, 4) low dietary concentrations and poor bioavailability of sulfur amino acids.
- Plasma taurine concentration was low in 8% of dogs. Dogs with low plasma taurine were older, less active, had more medical problems and treatments, and had lower plasma albumin, cyst(e)ine, tryptophan, and alpha-amino-n-butyric acid concentrations than the other dogs.
- Of the nine taurine-deficient, clinically evaluated dogs, three had CHD that was reversed by taurine supplementation and one had retinal degeneration.
- When given a diet apparently adequate in sulfur amino acids for three weeks, the researchers compared six Newfoundlands to six Beagles. The Newfoundlands had lower concentrations of plasma taurine and cysteine and blood glutathione, lower *de novo* taurine synthesis, and greater fecal bile acid excretion.
- The difference in taurine status between Newfoundlands and Beagles appears explained by differences in *de novo* taurine synthesis. On the bases of metabolic body weight and liver weight, the Newfoundlands had less than half of the taurine synthesis rates of Beagles. Relative to Beagles, Newfoundlands consumed less food on a metabolic body weight basis to maintain their body weight. This difference agrees with previous findings on metabolic energy requirements in dogs. As a consequence, Newfoundlands had lower total intakes of methionine and cysteine relative to the Beagles. Lower concentrations of plasma cysteine and blood glutathione in Newfoundlands, relative to Beagles, probably reflect lower intakes of methionine and cysteine by the Newfoundlands. So, Newfoundlands would appear to have a higher dietary sulfur amino acid requirement than Beagles, a model breed used in nutrient requirement determinations.
- These findings support the theory that taurine deficiency in dogs may be related to the consumption of certain dietary ingredients. Scientific and clinical evidence supports the hypothesis that dilated cardiomyopathy is associated with low blood taurine concentration in dogs.
- The authors noted, "Taurine deficiency in dogs is suggested to result from reduced sulfur amino acid bioavailability in dietary ingredients that are heat processed, such as rendered meat meals."

### **Dietary beet pulp decreases taurine status in dogs fed low protein diet**

Ko and Fascetti, 2016

- 18 medium/large mixed-breed dogs were split into three groups.
- Each group was fed purified diets that contained either rice bran, beet pulp, **or** cellulose. Each of these diets included 12% protein containing 0.23% methionine and 0.12% cysteine. This prevented an excess of substrates for taurine synthesis that might overwhelm the effects of fibers on the taurine metabolism studied. 12% protein is higher than the minimum requirement of protein for maintenance of dogs described in National Research Council, and 0.35% of sulfur amino acid concentration in the diets is within the range of total sulfur amino acid requirement (0.2–0.4 % of diets) for maintenance of adult dogs.

- Before feeding the three groups these diets, the researchers fed them all the same expanded diet with 29.5% protein containing 0.58% methionine and 0.46% cysteine (as-fed basis) which was prepared to maintain an excess production of taurine for the maintenance of taurine homeostasis in these dogs, as determined by short-term nitrogen balance experiments.
- The beet pulp group, compared to the cellulose and rice bran groups, showed significantly lower taurine concentrations in plasma, in whole blood, and lower apparent protein digestibility, and higher bile acid excretions after twelve weeks.
- In summary, rather than rice, **dietary beet pulp showed the most significant effect in lowering plasma and whole taurine concentrations**, in part, by decreasing the protein digestibility (sulfur amino acid bioavailability), by enhancing fecal excretion of bile acids and possibly, by enhancing degradation of taurine by the gut microflora in dogs. These findings may result from the greater effect of beet pulp fiber than rice bran or cellulose on intestinal bacterial fermentation that cleaves taurocholic acid and destroys the taurine released. In conclusion, since cellulose was the control fiber, and rice bran caused similar responses as cellulose, the study authors concluded that rice bran is unlikely the cause of the increased risk of taurine deficiency in dogs fed lamb and rice diets.

## FDA Statement

This section of the FDA statement caught our eye:

Diets in cases reported to the FDA frequently list potatoes or multiple legumes such as peas, lentils, other “pulses” (seeds of legumes), and their protein, starch and fiber derivatives early in the ingredient list, indicating that they are main ingredients. Early reports from the veterinary cardiology community indicate that the dogs consistently ate these foods as their primary source of nutrition for time periods ranging from months to years. High levels of legumes or potatoes appear to be more common in diets labeled as “grain-free,” but it is not yet known how these ingredients are linked to cases of DCM. Changes in diet, especially for dogs with DCM, should be made in consultation with a licensed veterinarian.

The FDA is simply stating a trend. These types of trends lead to much needed research.

The FDA is **not** dismissing the prior research as invalid. As the FDA puts it, “The underlying cause of DCM is not truly known, but is thought to have a genetic component.”

The FDA is also **not** saying you should stop feeding grain-free foods.

## Should you stop feeding grain-free foods?

If you've stopped feeding grains to your companion dog, think back to the many reasons why you stopped. It could be to prevent leaky gut syndrome, to help curb food sensitivities or intolerances to a particular grain, to maintain optimal weight in your dog, etc.

What we suggest you do, if you are concerned, is to have your veterinarian take a blood sample to measure the methionine, cysteine and taurine levels in both whole blood and plasma, and send it to a diagnostic laboratory experienced with the appropriate reference ranges for circulating taurine. If the levels are lower than normal for dogs, please discuss the appropriate next steps with your veterinarian. As well,

please send the information on your dog, including the food you are feeding, breed, health regarding CHD and retinal degradation, age and weight to the FDA no matter what the results are. You and your dog would potentially be helping millions of other dogs.

Finally, we noted that a veterinary nutritionist has made some nuanced statements on this issue, but they could be dismissed because a direct correlation was not stated. However, if one just skimmed the article, the impression being made is that boutique, grain-free, unbalanced home-prepared and raw diets are to blame for the current presumed uptick in cases of CHD.

For the boutique and raw segments of the pet food industry mentioned here, we assume the author is referring to small pet food manufacturers. Many of these manufacturers are transparent in identifying their sourcing of ingredients. Additionally, many do not include beet pulp in their formulations. These manufacturers also meet the AAFCO standards. If they do not meet these standards, the labels clearly state that.

As most of us know, the grain-free pet food trend was started primarily in the boutique pet food segment. Now, we are seeing grain-free foods pop up from the major pet food manufacturers. When we looked at the formulations from some major pet food manufacturers, many of those foods contained beet pulp. We are not saying or implying that beet pulp is causative of DCM here, because we just don't have the requisite definitive information.

With regard to the comments about raw food, researchers document the degradation of amino acids when cooked. As Bermingham and her team found comparing raw to kibble diets, "Fecal weight and volatile fatty acids levels were lower and the apparent digestibility of protein and energy were higher in dogs on the raw diet."

We are advocates for home-prepared food. However, we agree that the recipes used may not meet the minimum AAFCO nutrient requirements. If you do choose to go that route, please work with a veterinary or animal nutritionist who has a degree and experience in animal nutrition.

As more research is completed, AAFCO may need to adjust their minimum nutrient requirements and add more optimal requirements so that foods can be more appropriately formulated for breed type, size and age.

In our view, neither a balanced raw nor cooked diet is inherently "better" than the other. We work with many dogs that thrive on raw food diets, and others that do less well on raw foods but thrive on freshly prepared cooked foods. As we keep coming back to, every dog is an individual, and we believe that individual needs should outweigh a devotion to any one way of feeding.

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