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## INTRODUCTION

The FDA report from 2018 warned the public about a possible link between grain-free diets and dilated cardiomyopathy in dogs. All dog foods involved in case reports met all the required nutrients as outlined by AAFCO (2019). In many of the cases reported, but not all, the animals presented a low taurine concentrations in plasma or whole blood. Moreover, there was a higher number of large-breed dogs involved in those cases. The objective of this study was to determine the effects of feeding a grain-free diet to large breed dogs on taurine status and bile acid excretion.

## MATERIALS AND METHODS

Eight Labrador Retrievers (4 males, 4 females; Four Rivers Kennel, MO) were individually housed and fed a kennel diet (FRK) up to and including baseline measures. Dogs then received a commercial complete and balanced grain-free diet (Acana Pork and Squash formula; APS; Table 1) for 26 weeks. Fasted blood samples were collected at weeks, 0, 13, and 26 for analyses of plasma and whole blood taurine. Urine was collected by free catch and analyzed for taurine and creatinine at weeks 0 and 26. Fresh fecal samples were collected and analyzed for bile acids at weeks 0 and 26. Data were analyzed using the GLIMMIX procedure with repeated measures in SAS (v. 9.4).

Table 1. Nutrient composition of experimental diets.

Composition, %	FRK <sup>1</sup>	APS <sup>2</sup>
Moisture	6.50	8.40
Crude protein*	30.89	37.81
Crude fat*	16.79	18.78
Ash*	9.97	8.06
Total dietary fiber*	13.60	11.40
Methionine*	0.43	0.55
Methionine+Cystine*	0.99	0.85
Taurine*	0.07	0.14

\*Dry matter basis.

<sup>1</sup> FRK: Laboratory diet. MFA Gold N Pro. Ingredient composition: poultry by-product meal, ground corn, corn distillers dried grain with solubles, pearled barley, poultry fat, porcine meal, dried plain beet pulp, poultry liver, flavors, flax seeds, and minerals and vitamins.

<sup>2</sup> APS: Acana Pork and Squash. Ingredient composition: deboned pork, pork meal, whole lentils, pork liver, pork fat, whole peas, lentil fiber, pea starch, butternut squash, pollock oil, natural pork flavor, pork cartilage, pumpkin, salt, mixed tocopherols, zinc proteinate, dried kelp, calcium pantothenate, taurine, freeze dried pork liver, copper proteinate, chicory root, turmeric, dried *Lactobacillus acidophilus* fermentation product, dried *Bifidobacterium animalis* fermentation product, dried *Lactobacillus casei* fermentation product.

## RESULTS AND DISCUSSION

Table 2. Plasma sulfur amino acid concentration, whole blood taurine content, and urine taurine:creatinine ratio.

Amino acid, nmol/mL	Week			SEM <sup>1</sup>
	0	13	26	
L-methionine	94 <sup>b</sup>	128 <sup>b</sup>	230 <sup>a</sup>	24
L-cystine	4.1	2.6	3.6	0.82
Cystathionine	33.5	60.8	66.4	13.1
Taurine, plasma	107 <sup>c</sup>	157 <sup>b</sup>	192 <sup>a</sup>	11.4
Taurine, whole blood	186 <sup>b</sup>	204 <sup>b</sup>	295 <sup>a</sup>	20.2
Urine Taurine:Creatinine	0.25	-	0.28	0.07

<sup>abc</sup> Means with different superscripts differ,  $p < 0.05$

<sup>1</sup> SEM: Standard error of the mean.

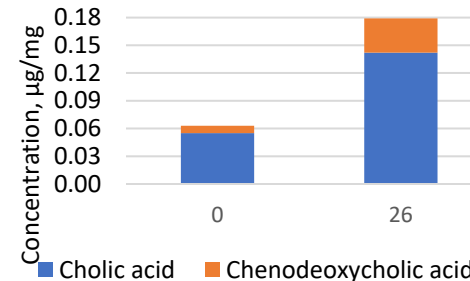


Figure 1. Fecal primary bile acid concentration.

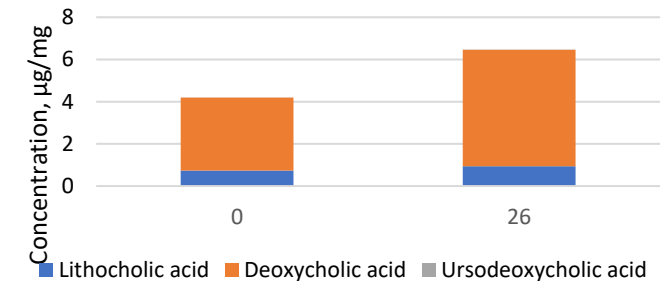


Figure 2. Fecal secondary bile acid concentration.

## CONCLUSION

Feeding APS to large breed dogs increased plasma methionine and taurine and whole blood taurine. Urinary excretion of taurine was not affected. Fecal excretion of bile acids increased, but this increase did not affect dog health and overall sulfur amino acid status. Feeding APS does not elicit a decrease in sulfur amino acid status and future work is needed to understand what other potential metabolic effects result from eating a grain-free diet that may underpin the etiology of dilated cardiomyopathy.