**Nutritional Management of Early Chronic Kidney Disease**

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Nutrition is arguably the most important aspect of chronic kidney disease (CKD) management. Because CKD encompasses a wide spectrum of pathology and severity, nutritional goals will vary by underlying cause and stage of disease. Most therapeutic diets designed for CKD utilize a combination of moderately restricted protein, phosphorus, and sodium with moderately elevated concentrations of omega-3 fatty acids and potassium.

The restriction of protein as a dietary management strategy for CKD has become increasingly controversial. Some argue dogs and cats with kidney disease should not be placed on a low protein diet in an effort to retain muscle mass and increase diet palatability while others cite research suggesting restricted protein diets in combination with other nutrient modifications reduce morbidity and prolong lifespan. The goals behind lowering the concentration of protein in diets fed to dogs and cats with CKD are to reduce the amount of nitrogenous waste products produced during cellular metabolism, while also minimizing the amount of protein entering the glomerular filtrate of the kidneys. In dogs and cats with naturally occurring kidney disease, restriction of protein in combination with other dietary modifications appears beneficial, particularly in later stages of disease.

When assessing the protein content of a diet, it is important to remember that animals actually require amino acids, rather than protein. By feeding protein sources with well-balanced ratios of essential amino acids that are readily digested and absorbed, we can lower the overall protein content of the diet while preventing protein malnutrition. It is also important to note that all diets currently marketed for management of CKD in dogs and cats exceed the recommended protein allowance set by the National Research Council.

While the degree of protein restriction required for CKD management is debatable, the need for phosphorus restriction is less controversial. Reducing phosphorus in the diet reduces hyperphosphatemia and the sequela of renal secondary hyperparathyroidism in later stages of kidney disease. While phosphorus restriction has not been specifically evaluated in early stages of CKD, it is generally accepted that lower dietary phosphorus is unlikely to have significant negative consequences.

Sodium restriction has been recommended as a method of combatting hypertension associated with CKD. Hypokalemia is a well-recognized consequence of renal disease in dogs and cats and most therapeutic renal diets have moderately high levels of potassium. Diets high in omega-3 fatty acids reduce glomerular capillary pressure, proteinuria, and abate the decline of kidney function in dogs with experimentally induced CKD. In addition, cats fed a therapeutic kidney diet with a higher concentration of the omega-3 fatty acid EPA had longer survival times compared to cats eating other therapeutic kidney diets.

There is still much to learn about the nutritional needs of dogs and cats with early stages of CKD. While the combination of moderately low protein, low phosphorus, moderate sodium, and moderately high potassium and omega 3 fatty acids is proven to reduce uremia and extend the lifespan of dogs and cats with later stages of CKD, controversy remains regarding the optimal dietary protein concentrations for early stages of this disease. Dogs and cats with early stages of CKD will likely tolerate higher concentrations of protein as compared to those with severe azotemia. With the advent of new therapeutic renal diets targeted to early stages of CKD, it is reasonable, and likely advantageous, to feed a diet incorporating the principles of traditional renal diets while also providing moderately higher concentrations of protein.

Estimating the protein and phosphorus diets based on a pet food label has some challenges. The amount of phosphorus in a diet is not part of the required labeling in pet food so you may need to look on a company website or call the manufacturer to get this value. The percentage of nutrients listed on a bag or can are on an “as fed” basis, meaning it is the percentage of those nutrients with the moisture included. Due to the increased moisture, nutrients listed in canned foods will usually be lower than those listed on dry kibble. To make more accurate comparisons, the percentages on the label should be converted to the grams of nutrient on a calorie basis. This requires a little simple math.

1. Find the nutrient of interest on the pet food label (e.g. protein)
2. Find the calorie density of the food on the pet food label
	1. Listed as kilocalories per kilogram (kg) of diet
		1. Typical dry dog and cat food will range between about 3000 to 4500 kilocalories per kg
		2. Typical canned dog and cat food will range between about 900 to 1100 kilocalories per kg
	2. Divide the kilocalories per kg of diet by 10,000
		1. e.g. a food that is 3500 kilocalories per kg = 0.3500
3. Take the % of the nutrient of interest on the label and divide by the calorie density/10,000
	1. If the label says a diet is 20% protein, you would now divide 20/0.3500 = 57
	2. This equals 57 grams of protein per 1000 calories of food

Now that you are able to convert nutrients from “as fed” to grams per 1000 kilocalories, remember that the numbers listed on guaranteed analysis are minimums and maximums. Therefore, the amount of protein you calculated is merely an estimation and the true value is likely 10-20% higher.

Based on the author’s clinical experience, when feeding for early kidney disease, avoid diets with phosphorus exceeding 1.6 grams per 1000 kcal for cats or 1.3 grams per 1000 kcal for dogs. Likewise, avoid diets with more than 85 grams of protein per 1000 kcal for cats or about 60 grams of protein per 1000 kcal for dogs. Cats and dogs with later stages of CKD should be fed a veterinarian-prescribed therapeutic diet.

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