

Changing Diet During Canine Kidney Disease



Chronic kidney failure is a complex and challenging condition for dog owners. They often receive conflicting and confusing information about changes to the diet. Some vets will recommend immediate and crucial changes, such as starting a homemade restricted protein diet, while others will suggest specialized and often expensive drystyle prescription food. And then there are those that will disagree with both these approaches and suggest various and all-too-often out-of-date alternatives as permanent measures. So, let me clarify and explain what really needs doing ... and when.

Kidney disease in dogs is not a simple and straightforward illness. Owners cannot expect to have an inflexible management plan to help their beloved best friends live longer and enjoy a better quality of life. The problem with chronic kidney failure is it keeps changing during its progression, and owners and vets need to adapt to these changes as they occur. While all dogs are different, there are common requirements and diet changes that help every dog with the illness. Knowing *when* to change food is just as important as knowing *what* to change.

Kidney Disease “Staging”

Dogs become diagnosed with chronic kidney failure at varying lengths into the disease. Many simply don't show symptoms until the condition has substantially progressed, while others get diagnosed early by vets conducting annual health checks, including blood and urine sample testing.

To complicate matters further, there are two very distinct forms of kidney failure – acute and chronic. Acute kidney failure is often caused by trauma or through accidental poisoning and

has a sudden onset. If spotted and treated early enough without too much damage being caused, acute renal failure is manageable and dogs can continue to lead a relatively healthy and normal life. When treatment is not so successful, the acute form of this disease progresses to become chronic kidney failure.

Chronic kidney failure develops much more slowly, sometimes over many months or years, and is more often genetic, age-related or due to prolonged and adverse external influences (such as diet). Chronic kidney failure is insidious and deteriorates progressively until it completely overwhelms a dog's health, leading to death. It cannot be cured, but the quality and longevity of life can sometimes be sustained and improved with proper management. This is more likely with an early diagnosis, as treatment gets a head-start on the disease.

Treating any associated conditions is important at the point of diagnosis. Kidney failure commonly accompanies urinary tract and bladder infections, hypertension, bladder stones, anaemia, loss of appetite, vomiting, and diarrhoea. Discovering the "stage" that the disease is at is just as important because different treatments and dietary changes will help resolve many of the associated health concerns and help stabilize the kidney failure.

There are four distinct stages, which the International Renal Interest Society (IRIS) identified and devised. IRIS's goal is to advance the worldwide scientific understanding of kidney diseases in small animals. A primary mission of IRIS is to help veterinary practitioners better understand, diagnose and treat kidney disease in dogs and they continue to update the information they provide as successful new advances come to light. In 2014/2015 they significantly updated their "staging" guidelines to include the new SDMA (which stands for the new renal biomarker Symmetric Dimethylarginine) test for canine kidney disease, devised by Idexx Laboratories. This valuable test is available as part of the normal blood test conducted by many vets, though it is worth asking in advance whether your own vet actually uses it. It would be unfortunate to have helpful information made inaccessible purely because a particular vet had not updated their surgery practice techniques.

Current IRIS Staging guidelines (2024) state that a consistent SDMA result of above 14 µg/dl indicates renal impairment and when creatinine levels in the blood are between 1.2 and 1.4 mg/dl, it suggests **Stage 1** kidney failure. This is also called early-stage kidney failure.

When SDMA is between 18 and 35 µg/dl and creatinine is between 1.4 and 2.8 mg/dl, IRIS confirms it as **Stage 2**.

When SDMA is between 36 and 54 µg/dl and creatinine is between 2.9 and 5.0 mg/dl, IRIS confirms it as **Stage 3**.

When creatinine is higher than 5.0 mg/dl, and SDMA is 5 µg/dl or above, IRIS confirms it as **Stage 4**. This is also called end stage kidney failure due to the increasing risk of systemic clinical signs and uremic crisis.

IRIS qualifies these "stages" of the disease into sub-categories, depending on the degree of hypertension (high blood pressure), renal azotaemia (abnormal BUN blood values), abnormally low urine specific gravity, urinary tract infections (UTIs) and evidence of proteinuria (protein found in urine samples). By collating all these results into a single profile, a vet can figure the stage the disease is at by referring to the IRIS guidelines. This is

important information, as it will help the owner decide which standard renal failure diet rules to follow and which can safely be ignored, for now.

One of the issues I have with some vets is their occasionally poor protocol in finely tuning the kidney stage following IRIS guidelines. Some assume a particular stage according to symptomology and all-too-scant blood and urine testing, and often without checking blood pressure.

Why Protein Is A Problem

Protein is good for most dogs. That's a fact. Dogs are omnivores, like humans, so they can eat a variety of foods to support a healthy lifestyle. As part of that diverse range of foods, they should eat both plant and animal proteins – but dogs are uniquely adapted to take advantage of animal protein ... meat, in other words. And that's why meat should always play a big part in a dog's diet. Protein is in every cell of a dog's body, including hair, muscles, skin and nails. It provides energy and helps the body repair itself in times of trauma or illness.

There has been a huge amount of confusion and misdirection about protein and its influence, harm and benefit in canine kidney failure. Old studies suggested it was a major problem and warranted severe restriction in all cases. Some vets and dog nutritionists still think that way, even though they are operating under antiquated thinking. The reason protein got such a bad name was because the studies conducted years ago confirmed it caused stress on already compromised kidneys, but those studies weren't even conducted on dogs. In fact, it was rats they were testing the theory on, whose digestive tract and organs are not designed to deal with animal proteins. And it is from those early studies that the myth about the necessity for restricted protein began.

There is good evidence to suggest low-quality proteins *are* a problem for dogs, and even more so for dogs with kidney failure. And there is also good evidence to suggest protein restriction is beneficial at different stages of kidney failure, but completely unnecessary at other stages of the disease.

The difference between low-quality protein and high-quality protein isn't that hard to gauge, once we understand the source (and the quality) of this nutritional element in many varieties of manufactured dog food. Most cheap dog food – and some expensive ones - contain low-quality proteins. These usually consist of plant-based proteins, grains, maize, gluten, corn, soy and other bulk-filling ingredients that make it look like dog owners are getting more for their money. These poor protein sources contain very little nourishment for dogs and, even worse, they can create problems for kidney failure dogs.

These same cheap dog foods often also have low-quality animal proteins, which include animal by-products. These are often all those animal parts considered unfit for human consumption, such as beaks, feet, intestines and entrails. This group of proteins is difficult for dogs to digest and the kidneys find it demanding to deal with the high volume of harmful by-products and toxins. Damaged canine kidneys can't cope with the extra workload created by low-quality proteins, which means the health of these already compromised organs decline faster.

However, high-quality proteins are generally considered beneficial in the early stages (1 and 2) of this disease. High quality proteins are those meats, poultry and fish considered safe for humans to eat and contain at least nine of the essential amino acids a dog requires. Current research confirms restricting all animal protein really isn't necessary until stages 3 and 4 and any earlier reduction could in fact cause more harm than good. Evidence suggests premature restriction can lead to malnutrition, a loss of muscle mass and a more rapid decline in general health. Specialized manufactured renal canned dog foods are often low in protein, but the protein they do contain is usually of a high quality – so these products are more often better started later in the disease's progression (stages 3 and 4) when protein reduction becomes a necessity.

Canned is better than dry (kibble) foods, because it has a high volume of water, which help flush out the toxins. Dry dog foods (even prescription kidney foods) also commonly contain colorants, artificial flavours and preservatives, and these all add to the workload of the kidneys. Furthermore, there is evidence to suggest some dogs fed on dry kibble for most of their lives suffer from chronic dehydration, which could start and undoubtedly exacerbate existing kidney issues.

How much high-quality protein a dog needs for a healthy daily diet somewhat depends on who you ask. Some pet food product manufacturers put it as high as 30% of food content, while the general consensus from veterinary and nutrition specialists put it at 18%. Much depends on the dog and the type of protein. Dogs with very active routines (such as working dogs), those that are lactating and young puppies all need more protein in their diet (about 30%). In canine kidney failure, I would tend to err on the side of caution and restrict it to 18% of food eaten in stages 1 and 2 and then cut to a minimum of 1 gram of protein for every pound of body weight per day in later stages.

Of course, nothing is that simple, because we also have to consider the harm other common dog food ingredients are likely to cause.

Is Phosphorus Always Bad?

No. In fact, dogs need some phosphorus in their diet, but it is one of the most difficult of dog food ingredients to control. Why? Because just about all foods, whether manufactured or homemade, have varying amounts of the mineral in it. It's the second most abundant mineral after calcium found in the body, with about 85% in bone structure. Phosphorus needs restricting in canine kidney failure, because unhealthy kidneys can no longer remove excessive amounts of it from the blood. Excessive phosphate in a dog's body increases lethargy and adversely affects appetite. More importantly, studies show a reduced phosphorus intake helps prolong life and reduces kidney disease acceleration.

Abnormally high phosphorus can also lead to an irregular release of the parathyroid hormone (PTH), which helps regulate both calcium and phosphorus levels in the body. Low calcium and high phosphorus levels are the worst but also the most common combination in late-stage canine kidney failure. Calcium helps to bind excessive phosphorus and prevents it being absorbed into the bloodstream. Early phosphorus restriction is beneficial to all kidney failure dogs, but it becomes much more important as the disease progresses. Current research suggests those in stages 3 and 4 should eat foods with phosphorus levels between 0.2% and 0.5% and no more.

Unfortunately, protein (meat) is the primary source of phosphorus, so although meat and high-quality protein is beneficial in the diet early in the disease, both become harmful later on. It is for this reason that owners should constantly be on their guard and make themselves aware of changing circumstances. Regular blood testing will help show how the disease is progressing and highlight the right moment for diet changes.

Phosphate binding medication can help reduce abnormally high phosphorus levels. The best advice is to start a binder once diet restriction alone fails to prevent the levels from rising.

Regular blood testing will help decide the right moment to introduce a binder. Leaving it too late will make it harder to get phosphate levels back down. There are several different types of phosphate binder and your vet will help you decide which is best for your particular dog, depending on current blood readings. Binders are typically either calcium (acetate being better than carbonate) or aluminium (hydroxide) based and although they can create long term-use health problems, they are more beneficial on balance.

Although calcium-based binders generally work well, they can cause complications with calcium levels in the blood, so always take your vet's advice on whether to use it. Some internet sources recommend using crushed eggshells as a source of calcium, but eggshells are calcium carbonate which makes it both inefficient and potentially hazardous unless blood levels are carefully monitored. Aluminium hydroxide binders are generally preferred by many vets, but long-term use can lead to aluminium toxicity. Some argue that there are not many kidney failure dogs likely to survive long enough to develop aluminium toxicity, which makes the hazard somewhat redundant ... and that may very well be true.

Sevelamer (Renagel) is a polyamine-based binder developed as an alternative to aluminium hydroxide. Unfortunately, just like the relatively new lanthanum-based alternative binders, there are lots of unwanted side-effects and safety concerns which yet need more study and evaluation.

The Influence of Sodium

Sodium is an important and influential mineral involved in kidney disease. A dog's body uses sodium for some important functions including neurological signal conduction and maintaining the acid-base balance, osmotic pressure and extracellular volume (plasma). It also has a direct relationship with chloride in carrying out some of these life-essential operations. Dogs acquire sodium in the form of salt added to manufactured dog food, although the mineral also occurs naturally in almost all fresh food in varying concentrations.

The National Research Council (NRC) suggested an absolute minimum daily intake of 5mg per kg of a dog's body weight when it investigated nutritional requirements in 2006, with 13.3mg per kg being the daily recommendation. Working and racing dogs, including greyhounds, and growing puppies and lactating bitches all need higher levels. This guidance is for healthy dogs, but things are quite different for those suffering from chronic kidney failure.

Various research studies have provided conflicting advice on whether high levels of salt in a dog's diet are harmful or not. We have to consider the fact that dogs digestive and mineral balancing systems have evolved in very different ways to humans. For example, dogs

actually have no taste buds for salt and don't actually know whether they are eating it or not. The fact that some pet food manufacturers add it to improve palatability is completely ridiculous. Consequently, the 'salt' debate remains confused and uncertain. Tim Watson from Vetsonline states: *'From a clinical perspective, and in contrast to humans, there is no scientific evidence linking sodium intakes in dogs with increased risk of hypertension, renal or cardiac disease, or calcium oxalate urolithiasis.'*

While this doesn't particularly help owners, it is an interesting conclusion bearing in mind the various research studies examined. Vets tend to err on caution and follow the general rule that says salt is probably linked to high blood pressure, renal disease and bladder and kidney stone formation. Until more is known, caution is probably the safest approach.

Canine kidney disease (CKD) causes concern about sodium levels, because they can unpredictably rise (sometimes due to inappropriate saline solution fluid therapy being administered or due to dehydration or administering high doses of corticosteroid medications like Prednisone). But, more often they fall below normal particularly in late-stage kidney disease. Sodium levels more commonly plummet due to prolonged bouts of vomiting, diarrhoea and metabolic acidosis (abnormal blood Ph). While huge volumes of internet sources commonly tell CKD dog owners to cut salt intake, this might be counterproductive without adequate and regular blood tests to confirm what the levels are actually doing at any particular time.

Intravenous (IV) and subcutaneous (SubQ) fluid therapy is one of the first lines of treatment for kidney failure, as it helps flush harmful toxins from the system and is the best method of bringing abnormal blood levels (BUN and creatinine) back down. However, sodium levels and fluid retention complicate things. In humans, too much water and we excrete more while retaining salt, too much salt and we increase salt excretion while retaining water. And it is this last response that leads to an increase in the body's fluid load ... and that potentially increases blood pressure. If this same mechanism affects dogs (a possibility that is still being debated), then IV and SubQ fluid therapy could have the unfortunate effect of promoting hypertension.

The risk of hypertension and the effect that higher levels of salt may have in causing the condition is a real complication. Some studies suggest up to 93% of dogs with kidney disease suffer from it. For this reason alone, it is worth getting a vet to check a dog's blood pressure at the point of diagnosis. Bringing blood pressure down to a normal level will help in the fight to stabilize renal function or, at the worst, it will prevent more rapid deterioration. Hypertension has recently been added to the IRIS Staging Guide, proving it remains an extremely influential condition and one worth keeping a close eye on as the disease progresses.

Regardless of whether it is ever proved that salt in the diet actually has any effect on hypertension in dogs or not, it makes sense to restrict sodium when blood levels are abnormally high. Kidney disease has an erratic effect on mineral absorption and excretion, making sodium levels worthy of scrutiny by dog owners and their vets. When restriction of this mineral becomes necessary, it's worth considering the level of salt in any manufactured dog food and in drinking water. Tap water often has salt added by the utility companies

during the cleaning and filtering process, so using filtered water for your CKD dog would be helpful, at least until sodium levels in the blood fall back to normal.

Potassium Concentrations

Potassium is often called an electrolyte or a mineral, and is in fact both. Concentrations in canine kidney failure are unpredictable and they can become abnormally high or low, although it is more common for this mineral's level to become depleted. The loss occurs due to poor eating and/or because potassium is over-excreted due to increased urination. In acute renal failure, potassium tends to rise – whereas in chronic kidney failure the level more commonly falls. The kidneys ordinarily control how much of the mineral a dog's body needs and keeps the amount of potassium in blood within a crucial margin, so when these organs start to fail the balance becomes unstable.

Abnormally low or high blood potassium levels interfere with a dog's heartbeat. Muscle weakness and impaired kidney function are also adverse effects of low potassium levels. When a dog's blood level drops too low, canine specific potassium supplements help combat common kidney disease symptoms such as listlessness and weakness. Regular blood testing is important to find any abnormalities, as this allows for proper intervention to occur at the earliest opportunity.

The National Research Council recommends an adequate daily allowance of potassium in the canine diet amounting to 0.14g. This is a useful benchmark for those owners that are providing home cooked meals for their CKD dogs.

Vitamin Supplementation Can Be Beneficial – and Dangerous

Some essential vitamins are commonly depleted in CKD, which means supplementation is often beneficial and advised. However, supplementing with the wrong vitamins or oversupplying certain vitamins can lead to overdose and/or further aggravate the kidney disease itself. A dog on a specially manufactured renal product (including prescribed dog foods) will get enough vitamins in the food they are eating – but those eating insufficient amounts or those receiving home cooked meals may suffer from vitamin deficiency. In these cases, it's a good idea to give added supplementation.

Individual and multivitamin formulations designed for human consumption should never be given to dogs. They are too concentrated, have an inappropriate vitamin balance and often include some vitamins that will create further renal deterioration in CKD dogs. Multivitamin formulations for humans also tend to include phosphorus in the product, which is extremely disadvantageous. Vitamins D and A are of the greatest concern in some products, as both have adverse implications in the case of canine kidney disease. Specially formulated renal dog foods have the right daily amounts of vitamins D and A in them, which means there is usually no need for further supplementation. In the case of owners providing homemade diets, the best total daily intake diet guide is 400 IUs of vitamin D and 4,000 IUs of vitamin A to a large dog, half that much for a medium-sized dog, and 1/4 of that amount to a small dog – and even less for miniature dogs (source: DogAware).

It's worth mentioning that vitamin D is not a simple compound as it has various components to it. In CKD dogs, some elements of vitamin D (calcitriol) can become depleted and this

causes larger concentrations of parathyroid hormone (PTH) to circulate. Studies suggest raised PTH creates some of the common symptoms of kidney failure. In such cases, giving low doses of vitamin D (1, 25 dihydroxycholecalciferol [calcitriol]) will suppress PTH and possibly slow the rate of progression of kidney deterioration. Due to the dangerous influence and interactions of vitamin D, any supplementation over and above the daily need should only be undertaken with veterinary approval.

Vitamin E supplementation in CKD and is even more important when salmon oil is given (as a rich source of omega-3 fatty acids) because the salmon oil reduces vitamin E concentrations. Give about 1 to 2 IUs of canine-specific vitamin E supplement per pound of body weight daily. Vitamin E is a useful antioxidant that supports kidney function, but much of this water-soluble vitamin is lost from a dog's body due to excessive urination.

Vitamin B complex is a group of vitamins that is also lost in CKD. While supplementation doesn't help the kidneys, it will support other functions and systems that rely on this essential dietary intake. Vitamin B is also an appetite stimulant and may indirectly help improve a CKD dog's food consumption.

Vitamin C is another water-soluble vitamin that is lost due to increased urination. Vets often recommend supplementing the diet with vitamin C (unless a special kidney food or standard dog food product is being given) and even more so when a dog is not eating properly. Frustratingly, there is an association between the lack of vitamin C and anorexia in dogs. Anorexia is a common symptom of CKD and may actually be a contributing cause of the vicious cycle of poor eating and the inadequate intake of essential vitamins.

Vitamin A is perhaps the most contentious vitamin to supplement without veterinary approval. Unlike water-soluble vitamins C and B, vitamin A is fat soluble and can accumulate in a dog's blood as it is not excreted in the same way. Humans with renal failure are known to suffer from an inadequate ability to excrete any excess. Although there is no evidence to suggest the same process occurs in dogs, it remains a concern (*'Nutritional Management of Chronic Renal Disease'*, Andrea J. Fascetti and Sean J. Delaney).

The liver stores most of the available vitamin A until needed. When there is damage to the liver or when there is more vitamin A than the liver can store, excessive amounts roam in the bloodstream and have the potential to cause toxicity. In reality, this is unlikely. The only examples ever recorded have occurred in experimental cases when enormous volumes of the vitamin were given (*'Fat-Soluble Vitamins: A, D, E & K in Dogs'*, Drs. Foster & Smith, *PetEducation*). Home cooked diets that include fish (or fish oil), egg yolks, liver or green leafy vegetables will offer enough vitamin A for normal nutrition. This antioxidant vitamin is essential for healthy vision, coat, muscles, nerves and skin. Standard and specialized dog foods are often fortified with vitamin A, making extra supplementation completely unnecessary.

The American Association of Feed Control Officials (AAFCO) recommends 50 IU per pound of body weight as a minimum daily amount of vitamin A.

Don't Believe the Hype About Fatty Foods

One of the many myths about nutrition in dogs originates from the human experience. We are all aware of the health concerns about fatty foods and how they have a harmful effect on weight, circulation and heart. However, just because overindulging in fatty foods is generally bad for humans, it doesn't necessarily follow that the same is true for dogs. In fact, dogs' metabolisms and digestive systems are well-adapted to deal with high levels of fat in the diet. They do not commonly suffer from high cholesterol health issues or the same ill-effects of a high-fat diet, needing between 10% to 15% fat in the food they eat to support good health.

A deficiency of fat in their food causes some worrying complications, including a dry and itchy skin, dull coat, inefficient immune system, heart disease and diabetes. Importantly, when a restricted protein diet is given to CKD dogs, the fat content in food becomes much more important because it provides energy, stamina, and nourishment. Studies recommend moderate to high-fat food ingredients for CKD dogs. They give calories and are often relatively low in phosphorus, so also help improve blood level results in the longer term. A medium-sized healthy dog weighing 33lbs should have 14g of fat in the daily diet (National Research Council). This equates to 0.42g of fat per pound of dog weight.

Unfortunately, one of the biggest dangers of using fat in the diet of CKD dogs is the potential of aggravating pancreatitis. Renal disease predisposes dogs to this condition and fatty foods cause pancreatitis to worsen. Studies also prove a link between low-protein high-fat diets and the onset of pancreatitis, which has led some to question this combination in manufactured kidney-specific dog food products. Dogs with pancreatitis are likely to suffer from a painful abdomen (forward crouching and stretching movements might be symptoms of this), lack of appetite, depression, dehydration, a 'hunched up' posture, vomiting, and occasionally diarrhoea and difficulty breathing.

Pancreatitis is often difficult for vets to diagnose as the symptoms can vary and are often confused by other primary conditions. In the case of CKD, owners should consider whether pancreatitis is the cause of some symptoms ... and ask their vet to undertake a serum lipase & cPL (Idexx Laboratories) test, which will help diagnose the condition in about 75% of cases.

The Role of Iron in Diet

Iron is absolutely crucial for dogs – and maybe even more so to CKD dogs – as it combines with copper to form a protein in red blood cells called haemoglobin, which is the essential oxygen carrying-part of blood. One of the great dangers of kidney disease is anaemia, which involves a reduction in red blood cells and haemoglobin. A deficiency of iron causes poor growth rate, weakness, and increased vulnerability to stress and disease. Dogs with an iron deficiency can also suffer from constipation.

Because red blood cells have a limited life (about 110 days), it takes a constant supply of iron to support their production. In severe cases of red blood cell loss, recombinant human erythropoietin can alternatively be administered to supplement endogenous erythropoietin, which will stimulate red blood cell production in dogs with kidney disease.

While an excess of iron can cause some serious issues, including interference with phosphate absorption, incidents involving iron toxicity in dogs with CKD are unusual. Its far more likely a deficiency will arise, particularly when inconsistent eating habits and poor nutrition are occurring. Other potential causes of anaemia due to iron deficiency include gastrointestinal tract blood loss (due to uraemia), parasitic infection, lymphoma, chronic inflammatory disease and urinary tract infections (UTIs). However, supplementation is not always recommended, because giving extra iron can dangerously affect some anaemias (canine autoimmune haemolytic anaemia being just one example).

An analysis of food ingredients is the best way of ensuring a dog gets the proper amount of iron. The recommendation is 0.65mg per kg of body weight per day (source: National Academy of Sciences). The recommended dosages are 100 to 300 mg per day for dogs with renal disease (providing 20 to 60 mg of elemental iron). As accurate dosages need calculating for the stage of kidney disease, for the size and weight of dogs and the degree of iron deficiency shown in blood results, it is important to have veterinary involvement in devising a supplement treatment plan.

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