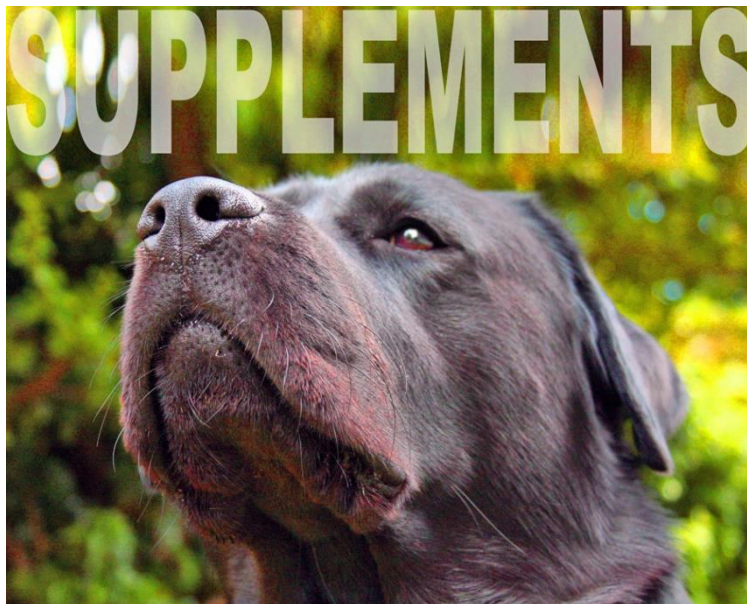


SUPPLEMENTS USED FOR KIDNEY FAILURE IN DOGS



Owners of dogs with chronic kidney failure often look to the Internet for information and advice about this devastating disease. Distraught and desperate, they are then bombarded with article after article about so-called cures, herbal remedies and never-heard-of-before radical new treatments. While some of these are undoubtedly genuine, others are promoting dubious supplements from companies preying on the emotionally vulnerable. I hope this article helps owners make a more informed choice between them.

There are a few tried and tested additions that can truly help dogs with chronic kidney failure (CKF). Some dietary supplements are available at local pet stores or from supermarkets – while suppliers sell other products directly on the internet. Since all these natural or processed supplements interact in different ways with the canine body and with some prescribed medications, please consult your vet beforehand about any that you intend giving. Bear in mind that some manufactured supplements available (including some listed below) have no trustworthy scientific evidence to back up the claims being made, which means their effectiveness is often only anecdotal and cannot be guaranteed.

It is useful to point out that The National Kidney Foundation, an American organization, suggest that patients with kidney disease should not use herbal supplements at all. Some herbal compounds could have substances that irritate the kidneys, that put extra metabolic stress on the kidneys or that interfere with other medicines being used. Many also contain protein and minerals that need careful control in the diet.

The problem with a lot of herbal and other plant-based homeopathic remedies is they can have their own inbuilt defense mechanisms, which means they can further irritate the gut or interact adversely with a drug already being given. Any biologically active compound has the potential to cause side effects and anything advertised as free from all side effects is probably free from any effect at all.

In trying to help our best friends get through this devastating illness, we must also be sensible and cautious about what supplements we give on top of traditional tried-and-tested treatments. The following list intends only to tell dog owners about products and supplements available and what current research tells us about them. Please consult your vet before considering any particular supplement on this list.

Alfalfa (also known as Lucerne)

Alfalfa is sometimes referred to as Lucerne in Europe and Australia. In its original form, it is a perennial flowering plant in the legume family Fabaceae. It is cultivated as an important forage crop in many countries around the world. It is used for grazing, hay, and silage, as well as a green manure and crop cover. It has been used as a Chinese Herbal ingredient for centuries. Alfalfa promotes urine flow, which can help flush harmful bacteria from the body. Though it is not a proven method to treat an active urinary tract infection, it may help prevent infection from occurring in the first place. Unfortunately, its mild diuretic properties can increase the risk of dehydration in dogs with kidney disease, so extreme caution should be taken.

Alfalfa contains high amounts of vitamin K, which can interfere with blood-thinning medications. Always consult your vet before giving a dog this herbal ingredient.

Alfalfa can increase sensitivity to sunlight. When taken along with medications that may increase photosensitivity, short-haired dogs or those with thin hair or balding patches may be more prone to sunburns, rashes, or blistering.

One of the known side-effects in some dogs taking alfalfa supplements is the potential to introduce or extend digestive problems including nausea. While some sources suggest it can help such disorders, there are contradictory sources that suggest the opposite. The truth is, I suspect, we do not know.

My own concern is over the quality of the supplement and the manner in which it is grown and harvested. The seeds of alfalfa are auto-toxic to dogs. This is a well-established fact. But crops are also prone to Cantharidin, which is a potent vesicant and irritant produced by insects commonly known as blister beetles. Cantharidin can sometimes contaminate alfalfa. Cantharidin poisoning causes gastrointestinal and urinary tract irritation, and in severe cases can cause shock, circulatory collapse, and death.

Personally, I would tend to play safe and avoid alfalfa for dogs with kidney disease.

Ascorbic Acid

Ascorbic Acid, more commonly known as Vitamin C, is a naturally occurring antioxidant. It does not include calcium in the manufacturing process, which makes it far more suitable for CKF dogs than multivitamins or Vitamin C supplements found in health shops and pet stores. Standard Vitamin C supplements commonly contain calcium, sodium and magnesium. Dogs with kidney failure often suffer from increased calcium levels (hypercalcaemia), so it is important not to inadvertently make matters worse by giving a supplement that has these minerals. Pure Ascorbic Acid also doesn't include sodium or magnesium (sodium, particularly, can make symptoms worse).

Vitamin C does little to help the kidneys directly, but it does help correct the loss of this vitamin through increased thirst and fluid therapy and consequential frequent urinating. Excessive amounts of Vitamin C can cause stomach upset and diarrhea, so it is best to postpone giving it if these symptoms present themselves.

Astragalus Root

See 'Pet Wellbeing Five Leaf Botanicals'.

Azodyl

Azodyl is a mixture of probiotic organisms and prebiotic therapeutic supplements for dogs at varying stages of kidney failure. The manufacturer says it uses a mixture of three urease positive bacteria that work to actively reduce toxins in the bowel and circulatory system. Various studies have assessed how effective Azodyl is in treating chronic kidney failure, with most coming to disappointing conclusions. David J. Polzin, DVM, PhD, DACVIM, undertook a comprehensive research project (compared against others) in which 32 dogs with moderate renal failure were randomly given either Azodyl or a placebo. These dogs were later evaluated on their blood result levels, body condition and owner perception of quality of life.

Unfortunately, there were no significant differences between either group by the end of the research project. At the very best, this and other theoretical and in vitro study results suggests probiotic therapy might augment a 10% - 20% decrease in blood work markers of renal failure. In turn, this could be enough to affect clinical symptoms and the course of the disease – or not. Dog owners grasping around for anything that could promote positive change might consider these conclusions are encouraging enough to try Azodyl. I have spoken with many owners that firmly believe it has helped their dogs, despite the wholly inadequate scientific evidence to back-up such claims.

Azodyl should only be administered in capsule form, as any other delivery system will not allow it to reach the gut intact. Dog owners should also note that antibiotics are known to destroy the active ingredients contained in this product, so don't bother giving Azodyl until antibiotic treatment has finished. Further information is in the 'Probiotics' entry below.

Beet Pulp

Beet pulp introduces some fermentable fiber into a CKF dog's diet. This has the enormous benefit of enabling nitrogen excretion in the feces while also allowing dogs to consume adequate amounts of protein. Beet pulp helps to increase the volume of intestinal bacteria, which draws Urea (a nitrogen-containing waste product) into the feces. This process is sometimes called a Nitrogen Trap (Iams copyrighted term) and helps reinstate a task normally performed by the kidneys.

Cabbage

Dogs with kidney failure are prone to other problems, such as stomach ulcers and gastric irritation. Cooked chopped cabbage is a natural cure for these ailments as well as a great canine anti-oxidant. It is also a source of dietary fiber and Vitamins A and C. Give one dessert-spoon per meal, mixed with food, on alternate days. Too much cabbage can cause diarrhea and flatulence, so it is best

being judicious with the amounts given. It is equally important to cook the cabbage first, because raw cabbage has a compound called thiocyanate, which suppresses the thyroid gland leading potentially to hypothyroidism over time. The cooking process deactivates the thiocyanate and makes cabbage safe for consumption by CKF dogs.

Calcitriol

Calcitriol is an essential hormone that dogs with damaged kidneys are unable to produce. Consequently, calcium regulation goes out of control and hypercalcemia occurs. There are severe health issues with this condition, which include increased thirst and excessive urination, constipation, the potential for bladder stones, vomiting and reduced appetite, hypertension, confusion, lethargy and depression. Left untreated, hypercalcemia can also lead to coma. Supplementation with Calcitriol is a promising but very complex treatment requiring veterinary supervision.

Cannabis, CBD Oils, THC, Marijuana Oil, Hemp Seed Oil

While the product names above are often confused, each is quite different and dog owners should undertake comprehensive research as well as seeking advice and reliable guidance from professionals and their own vet. For the purpose of this supplements article CBD will be the collective term applied to all these substances.

The use of CBD in the treatment of dogs differs widely from country to country, person to person, and among veterinarians everywhere. There are also very diverse laws about the use of CBD, so before considering its use do make sure you are not about to commit an offense where ever you might reside.

CBD should only be purchased from highly reputable sources and NOT from unauthorised suppliers. Always consult your vet before buying to ensure the product is from a reliable and trusted source, and that the quality, safety and strength for canine use are all recognised and approved. Human CBD variations should never be used. Dogs are far more susceptible to the psychoactive and euphoric properties of some forms of CBD, which makes substances intended for humans very dangerous and potentially fatal for dogs.

CBD has been increasingly recognized as a useful and well researched form of supportive treatment for certain human conditions, and anecdotally for canine conditions too. According to Heather Lewellen, DVM, (reporting on the 2016 Nestlé Purina Companion Animal Nutrition Summit) these include cancer, nausea and vomiting (synthetic cannabinoids), pain, inappetence, inflammation, epilepsy and other seizures, infection (with methicillin-resistant *Staphylococcus aureus* and other bacteria), and anxiety. Regarding the latter, CBD might be particularly useful for those dogs that become over anxious when visiting the vets for blood to be drawn or while having IV or SubQ fluid therapy undertaken.

There is little to no research published on CBD as a treatment or therapy for kidney disease in dogs or other animals. As a result, we don't know that much about the direct effects of CBD or other cannabis products on the canine kidneys. But we do know that the kidneys play a role in eliminating CBD from the body. A 1990 study ('Identification of urinary metabolites of cannabidiol in the dog' by E Samara, M Bialer, and D J Harvey) identifies the results of cannabinoid absorption in the urine of

dogs who ingested CBD. There are no firm conclusions on whether CBD has a positive impact on kidney disease or kidney disorders. These findings are one reason why veterinarians are often in some disagreement over this entire subject.

Orally ingested CBD is likely to reduce inflammation across the whole body—kidneys included—thanks to its interactions with the far-reaching endocannabinoid system. However, while it may assist in reducing some of the common symptoms associated with kidney disorders, it is not a cure but more of an assumed supportive measure.

Writing in *Veterinary Partner*, Mark Rishniw, BVSc, PhD, DACVIM (SA-IM), DACVIM (CA) concludes:

‘A number of businesses market CBD pet products. As with any herbal product or dietary supplement, these products are not approved by the FDA; no one regulates any supplements, not vitamins nor nutritional products. Because premarket assessment is not required in these products, neither quality, safety, nor effectiveness of the products can be assured. For example, analysis of several products by the FDA in recent years revealed that the CBD content varied and in many products was either absent or nearly absent; this is the case with many supplements. This variability in product content will complicate interpretation of clinical trials in animals and their use in other products.’

CBD Oils

See “Cannabis”.

Coconut Oil

Coconut oil has some interesting properties. It’s rich in beneficial fats but low in vitamin D. Vitamin D is difficult for the kidneys to deal with, so this particular supplement reduces stress on the kidneys while still getting essential fats into the system. Various reports suggest that coconut oil may help promote healthy bones and joints, a healthy metabolism and weight, healthy thyroid function and support against fungi, viruses, bacteria and parasites. It is also considered to boost the immune system, which helps fight against infections common in canine kidney failure. Is any of this true? I don’t know. But I do know that coconut oil is one of the richest sources of saturated fats there is, with 90% of the oil being made up of saturated fatty acids. This helps kidney failure dogs by providing energy – and that energy can help them overcome some of the basic health issues associated with the disease.

If you intend to try coconut oil as a supplement for your dog, be sure to acquire a pure form of the edible oil from a reliable source. Some products have additives, which can have an adverse effect on kidney failure. The oil is usually in solid form and needs heating. The best way to do this is to place the bottle in warm water for a few minutes. The oil will then melt, making it easy to pour. For medium size dogs, use about a teaspoon on food per day.

It is important to point out that there is almost no research on the effect of coconut oil in dogs, apart from some studies looking at the topical treatment of parasites. Therefore, the benefits, health effects, and risks, are actually unknown and supported only by unreliable anecdotal evidence. There is some evidence to suggest it can have some adverse health effects in certain circumstances, so talk

to your vet before using it, particularly if your dog has tendencies towards abnormal fat metabolism or pancreatitis.

Coenzyme Q10

Coenzyme Q10 is also commonly known as CoQ10 or ubiquinone. There are studies that suggest CoQ10 is helpful in treating human renal disease, but there are no similar research studies that I could find about how it might interact in canine kidney failure. The recommendation is to give 1.5 mg of this antioxidant per pound of body weight daily, split into two equal doses. It is also easier absorbed if taken with a meal containing fatty meat. There are claims that CoQ10 boosts the immune system, improves the effects of heart disease and age-related cognitive dysfunction in humans. But, without reliable scientific research to back-up these claims in humans or dogs, the results from using it could prove disappointing.

Cordyceps Mycelium

See 'Pet Wellbeing Kidney Support Gold'.

Distilled or Purified Water

It may seem strange to include water as a supplement, but that's because we often take our water supply for granted without actually thinking about what goes into it. Tap water is full of chemicals, additives and elements that are toxic to dogs with kidney failure. For example, in hard water areas, it is likely the water supplier has added sodium to soften it. Diseased kidneys struggle to regulate this mineral and when there is an excess of sodium in a CKF dog's bloodstream, it can lead to urine retention, abnormal blood pressure and heart problems. Almost all special diets advised for dogs with this illness are low in salt (sodium chloride). But if we are still giving tap water that has sodium in it, we are undoing all the good that those special diets hope to do. It is much safer to give CKF dogs distilled or purified bottled water, which is free of most chemicals and additives. I prefer to use purified water, because distilled water removes ALL minerals, even the good ones. If you use filtered water, check whether the filter is efficient in removing sodium (not many are).

Dong Quai Root

See 'Pet wellbeing Kidney Support Gold'.

Echinacea

Echinacea is a herbaceous flowering plant that is also now widely grown for medicinal purposes. It is one of the more recognized herbs associated with immune modulation (Thacker 2010) and has been subjected to several very useful studies on dogs. One of the more influential studies looked at what effects Echinacea had on dogs that were being vaccinated against parvovirus, distemper, and canine adenovirus. Under normal circumstances, the immune system and response are initially undermined by these vaccinations.

This 2018 study by Yasaman Biazar, Reza Avizeh, Masoud Ghorbanpour, Hossein Najafzadeh Varzi, and Mohammad Razijalali of the Faculty of Veterinary Medicine, ShahidChamran University of Ahvaz, showed that Echinacea increased the level of hemoglobin and the number of red blood cells, which is consistent with similar studies on various animals and humans. Its long-term use has also

led to an increase in the total plasma protein, lymphocyte and neutrophil counts, without significant changes in the liver and kidney markers.

Canine kidney disease is commonly associated with several consequential and associated health issues. Of these, anemia, frequent urinary infections, and pancreatitis are likely to be linked to an under-functioning immune system and low red-blood-cell levels. Supplementing with Echinacea may therefore prove to be supportive rather than necessarily corrective against these common concerns.

There are different types of echinacea, and therefore some formulations are blends of the different forms. The blends that include alkylamides, cichoric acid, and polysaccharides appear to be the most beneficial (Rania Gollakner, BS, DVM, MPH). Dosing depends largely on the mixed varieties of the flower and root extracts. Human supplements of Echinacea are too concentrated and may contain substances such as alcohol, which is toxic to dogs. Echinacea capsules are widely available and several products are manufactured specifically for dogs. To help prevent potential side effects such as nausea and diarrhea, some experts in the field suggest this supplement should not be given for periods longer than 8 weeks at a time with alternating 4 week rest periods.

Endosorb

Endosorb is a product marketed for the treatment of diarrhoea in dogs, available in tablets or a suspension. The active ingredient in Endosorb is activated Attapulgitic Clay, which is thought to absorb toxins in the gut to reduce the irritation, discomfort, and cramping associated with diarrhoea in dogs and cats. Vets refer to it as an absorbent anti-diarrheal demulcent. It should not be used for more than 3 days (DogAware.com) so consult your vet if symptoms persist beyond this time.

Five Leaf Pet Botanicals

This company heavily advertises and promotes its so-called kidney health and support products, and as a consequence many dog owners buy them anticipating improved kidney function and better blood test results. It should be noted that while some of the ingredients in their products have some validity in helping support renal function, others do not and in fact are more likely to cause long-term harm.

For example, they add Vitamin A to some of their herbal mixtures. Vitamin A supplementation is not advised for dogs with kidney disease, because excesses cannot be extracted the same as with a healthy dog, and it therefore can build up to toxic levels. Parsley is also added to some of their products. Parsley also has Vitamin A in it – but it is also a natural diuretic, which means it acts like a "water pill" to cause the body to lose water. This can have serious adverse repercussions for a dog that is already dehydrated and ultimately it can lead to blood pressure complications. There is, of course, no unbiased reliable academic or scientific testing of the Five Leaf compounded products and therefore no evidence of them doing anything at all to promote better kidney health, despite what their website or anecdotal reviews might suggest.

Goat's Milk

Is raw goat's milk a supplement? Maybe not, but as it has become such a worldwide health trend promoted by companies, canine experts, and dog owners in recent years, I thought it should be included in this article. The benefits to dogs are said to be diverse and safe. Raw goat's milk is

promoted as a natural source of minerals, vitamins and enzymes contributing to improved overall health and a boosted immune system. In addition, it is reported to be a source of good bacteria for improved gut health, and also helps to sooth upset or sensitive stomachs. In terms of canine kidney disease, it is meant to have natural anti-inflammatory properties.

While I am happy to accept that goat's milk may be a useful source of calories, proteins and fatty acids, I feel it has some adverse qualities that generally make it unsuitable for most dogs with kidney disease.

Most dogs are lactose intolerant and goat's milk is purported to be more accepted by dogs than cow's milk as it has less lactose in it. My first question would be why on Earth would any dog owner want to give milk of any kind to a dog? It is not a natural or necessary diet ingredient for adult canines. Furthermore, cow's milk has 5% lactose and goat's milk has 4.2%, so the difference between them on that score is minimal. Many dogs have difficulty digesting dairy once they are weaned off it as puppies, so goat's milk may lead to gastrointestinal issues in some pets.

Milk generally is well-known for being a rich source of calcium, and goat's milk is no exception. Unfortunately, many dogs with kidney disease already have high serum calcium so adding to it can lead to a dangerous condition known as hypercalcaemia. This can lead to disturbances in nerve conductivity and cardiac muscle contractions, which can ultimately cause neurologic tremors or seizures, weakness, and cardiac arrhythmias. If calcium levels remain significantly elevated, the mineral can be deposited in any soft tissue or organ system in the body. Left untreated, hypercalcemia can be fatal.

All dairy products contain phosphorous, but goat's milk is rich in this substance, making it one of the worst products an owner can give if their dog is already struggling to keep blood phosphorous down to near-normal levels. The same is true for Vitamin A, which can build up in a kidney dog's system and grow to toxic levels. These facts and more lead me to conclude that owners need to be extremely cautious about giving goat's milk to any dog, but much more so when one has kidney disease.

Hawthorn

Gregory Tilford, author of *Herbs for Pets* says: 'When combined with ginkgo biloba (for small capillary circulation) and herbs that improve urinary function, hawthorn may be useful for getting more blood and oxygen into renal arteries and smaller vessels of the kidneys. This, in theory, is thought to slow degeneration of whatever healthy tissue remains in the diseased organs.'

Rania Gollakner, BS, DVM, MPH, states: 'Hawthorn is a supplement derived from the *Crataegus* plants of the rose family and is used to enhance digestion, lower blood cholesterol, and to support the heart. The likely active ingredient in hawthorn is an antioxidant bioflavonoid which is known for improving blood circulation to the heart. In animals, it has been used to manage certain heart diseases such as heart failure.'

It is important to stress that there have been no safety studies performed on how hawthorn interacts with the renal and other systems of dogs with kidney disease, so only use this supplement with your vet's approval.

Hemp Seed Oil

See "Cannabis".

Herbal Supplements Best Avoided

There are those that say ALL herbal supplements are best avoided, because the only proven action of homeopathy is to separate people from their money. While I don't entirely hold with that premise, I do think we need extra caution in the case of canine kidney failure. There are certain supplements that are exceptionally risky and which could interact severely and adversely in the canine body during all stages of renal disease. These include:

- Apium Graveolens
- Astragalus
- Barberry
- Cat's Claw
- Creatine
- Goldenrod
- Horsetail
- Huperzinea
- Java Tea Leaf
- Licorice Root
- Nettle, Stinging Nettle
- Oregon Grape Root
- Parsley Root
- Pennyroyal
- Ruta Graveolens
- Uva Ursi
- Yohimbe

Some herbal treatments that act like a diuretic or "water pill" may cause kidney irritation or further damage. These include bucha leaves and juniper berries, which are also best avoided in any supplements.

Iron

Iron deficiency can occur in dogs that have progressive and chronic kidney failure. The reason for this according to PetMD is: 'Erythropoietin (EPO) is a glycoprotein hormone, produced in the kidneys, that controls the production of red blood cells. For development and maturation of red blood cells to take place, bone marrow requires an adequate supply of erythropoietin, so in cases of chronic kidney disease (CKD), where the kidney is unable to function well enough to produce adequate amounts of EPO, the marrow is likewise unable to produce an adequate supply of red blood cells. Lack of RBC production will inevitably lead to anemia in dogs that are suffering from this condition. Anemia due to CKD is usually seen in middle-aged to older dogs but can also occur in young dogs.'

Talk to your vet If you suspect anemia in your dog. He will arrange a blood test to check erythropoietin levels, which will help diagnose the problem. Iron supplementation (the usual treatment for mild anemia) may not help, because the deficiency is in erythropoietin. In addition, by inappropriately giving veterinary unsupervised iron supplementation, raised serum levels of iron can become toxic and complicate things even more. The alternative is to give fully vet prescribed and monitored iron and vitamin C supplementation together, as this vitamin assists iron absorption.

More effective and faster treatment of anemia is by blood transfusion or by giving human erythropoietin. The only problem with this is, over time, a dog is likely to develop antibodies that cut the effectiveness of providing human erythropoietin.

Kidney Support Gold

See "Pet Wellbeing Kidney Support Gold".

Lucerne

See "Alfalfa".

Marijuana

See "Cannabis".

Milk Thistle

The positive health benefits of Milk Thistle have been known for some 2000 years, but to date there is little scientific evidence to prove its effectiveness in treating dogs with chronic kidney failure. Most herbal preparations contain extracts of the plant obtained from crushed seeds, which have a specific concentration of silymarin (a secondary metabolite). Some research suggests that milk thistle promotes kidney function, though most studies concern themselves with the more widely acknowledged liver function benefits. A small study in dogs found some differences in elevations of kidney values between those that got silymarin and those that didn't, following exposure to a kidney toxin (though the pattern was inconsistent).

The real benefit of Milk Thistle would seem to come from its antioxidant and anti-inflammatory properties. Given short-term, particularly while other more traditional medicines are being given, it may help protect the liver and the kidneys from progressive and irreversible damage. There is some concern about giving this herb long-term or administering an inappropriate dosage, because either can lead to a disruption in liver function. Milk Thistle also has some phosphorus, which is a mineral best avoided in canine kidney failure diets.

Omega-3 Fatty Acids

There are many clinical trials and studies that show Omega-3 has an influential role to play in improving the renal function of the kidneys of dogs. One of the first published was 'Beneficial effects of chronic administration of dietary omega-3 polyunsaturated fatty acids in dogs with renal insufficiency,' in 1998.

This and other studies since have indicated omega-3 supplementation can slow the rate of kidney disease. Fish oil is a primary source of this fatty acid, and of these the best is pure salmon oil (see below). Cod-liver oil is best avoided, because it is high in Vitamin D, which damaged kidneys find hard to process. Polyunsaturated vegetable oils are also ill-advised, as they are high in harmful and inflammatory omega-6 fatty acids. An easy way to supplement with omega-3 is to use a suitable proprietary formulation, such as Nordic Naturals Omega-3 Pet™ Soft Gels or Nature's Best Pet Nutrition Omega-3 capsules.

Oral Carbon Adsorbent

Damaging uremic toxins build up in the blood of those dogs suffering from kidney failure and push the creatinine and BUN (blood urea nitrogen) levels up. Scientists in Japan have found that adsorbents prevent toxic bacterial products (created by a dog's intestinal bacteria) from being absorbed. This in turn can help bring blood levels back down to within a normal range. The Japanese scientists investigating this process used carbon adsorbent, AST-120, which is an engineered activated carbon for oral use. This type of supplement is best discussed with and obtained through a vet, as it is not generally available on the high street or through the internet, and it can interact adversely with some medicines.

The use of activated carbon as a detoxifying agent is not new, but this is perhaps the first time a study has been undertaken in dogs with renal failure. There is certainly scope for further in-depth and quality-assured research into this potentially exciting detour from standard treatments.

Pet Wellbeing Kidney Support Gold

Kidney Support Gold is an expensive compounded herbal-based oil containing Rehmannia Root, Cordyceps Mycelium, Astragalus Root, and Dong Quai Root. On the plus side, the ingredients are certified organic or selectively imported (not sure what the latter means) and tested for purity. Rehmannia Root has some viable properties to assist kidney organ health (see Rehmannia Glutinosa below), but there are no unbiased independent and reliable academic studies to back up the claims made about it in the compounded tincture quantity of this product.

Cordyceps Mycelium is a medicinal mushroom also known as Chinese caterpillar fungus, and it is one of the most commonly used ingredients in traditional Chinese medicine for the treatment of people with chronic kidney disease (CKD). In a review of several published studies in 2014 (Hong Wei Zhang, Zhi Xiu Lin, Yuk Stewart Tung, Tze Hoi Kwan, Chun Keung Mok, Connie Leung, Lai Sum Chan, 'Cordyceps sinensis for treating chronic kidney disease') of the effects of the herb on human kidney disease patients, the authors stated: *'We found that Cordyceps preparation, as an adjuvant therapy to conventional medicine, showed potential promise to decrease serum creatinine, increase creatine clearance, reduce proteinuria and alleviate CKD-associated complications, such as increased haemoglobin and serum albumin. However, definitive conclusions could not be made because of the low quality of evidence.'*

Astragalus Root is known as a major immune-modulating herb in Western herbal medicine. It is said to have anti-inflammatory and antioxidant properties. Astragalus has been reviewed by Cochrane (Zhang HW1, Lin ZX, Xu C, et al. "Astragalus for treating chronic kidney disease". Cochrane Database Syst Rev. 2014 Oct 22) and was found to offer some promising effects in reducing proteinuria and

increasing haemoglobin. In a systematic review of Astragalus on diabetic nephropathy in animal models (Zhang J1, Xie X, Li C, et al. "Systematic review of the renal protective effect of Astragalus membranaceus root on diabetic nephropathy in animal models". J Ethnopharmacol. 2009 Nov 12) this herb was able to reduce blood glucose and albuminuria levels and reverse the glomerular hyperfiltration state. It is important to stress that many studies were performed in-vitro or on rats and mice rather than dogs, therefore the accuracy of any claims have not been verified in canine kidney disease.

Dong Quai Root is a herb more commonly referred to as Angelica and is widely used in Chinese Herbal Medicine. Some early research shows that a product containing dong quai and other herbs given by injection might reduce chest pain and improve heart function in people with heart disease (WebMD). It is said to stimulate the immune function in experimental animals (Meyler's Side Effects of Drugs 16th Edition, 2016) and has some anti-inflammatory properties. No reliable and unbiased research that I have found shows it supports or helps dogs with kidney disease.

Phosphorus

It is extremely important to limit the amount of phosphorus in a CKF dog's diet, because damaged kidneys are unable to excrete it in urine. When phosphorus levels in the blood start to rise, it has consequences for the normal phosphorus and calcium balance of the body, which in turn leads to weakened bones and further metabolic imbalances. This is so important that a vigilant vet will ordinarily check phosphorus levels through regular and routine blood tests. Some herbal supplements commonly have ingredients that contain phosphorus, which are clearly best avoided. These include:

- American Ginseng
- Bitter Melon
- Borage (leaf)
- Buchu (leaf)
- Coriander (leaf)
- Evening Primrose
- Feverfew
- Flaxseed
- Horseradish (root)
- Indian Sorrel (seed)
- Milk Thistle
- Onion (leaf)
- Pokeweed (shoot)
- Purslane
- Shepherd's Purse
- Silk Cotton Tree (seed)
- Stinging Nettle (leaf)
- Sunflower (seed)
- Turmeric (rhizome)
- Water Lotus

- Yellow Dock
- Potassium

The correct balance of potassium is essential for dogs with kidney failure, because it helps support the right fluid and electrolyte balance in the body and plays a role in maintaining blood volume and healthy brain activity. Healthy kidneys ordinarily regulate potassium, but the levels can rise when these organs have become damaged. This condition is known as hyperkalemia and causes fatigue, nausea and an irregular, slow heartbeat. It can become life threatening if left untreated. Conversely, in the later stages of kidney failure, dogs can suffer from low potassium levels, because they don't get the nutrients and minerals they need due to poor and irregular eating patterns. In addition, fluid therapy and increased urination can cause the undesirable loss of this mineral. Low potassium levels are just as dangerous as high levels.

It is important for dog owners to check with their vets before supplementing with potassium, because if levels are already high, additional supplementation will simply make matters worse. It is worth adding that most commercially produced dog food, including kidney specific dog foods, include low but adequate levels of potassium in the ingredients. Regular blood level checks will help find any imbalance and allow treatment of the condition to begin, before it becomes critical. Potassium gluconate or potassium citrate is usually given orally if a deficiency demands it. The alternative, potassium chloride, is acidifying and best avoided (vetmed.wsu.edu advice).

Probiotics

There are lots of claims made about probiotics and how they theoretically help in chronic kidney failure. Unfortunately, there are absolutely no claims substantiated by reliable research. Mark Crislip MD put it best when he said:

'We understand very little about the important and complex ecology of the gastrointestinal tract, about what bugs are there and what they do for or to us. So while the idea of influencing this flora to restore or support health makes some sense, adding a few Lactobacillus to the mix and expecting it to have a major effect seems a bit like tossing a few grass seeds into the Amazon rain forest and expecting a golf course to grow there.'

The claim commonly made is that probiotics help break down the byproducts of digestion that help cause uremia, which in turn produces high creatinine and BUN levels. Backing up this claim are some small and unreliable studies, usually financed or conducted by specific probiotic companies. Influentially, there are thousands of dog owners that have offered anecdotal evidence about their dogs improving after being given probiotic supplements.

Perhaps the best clinical study being undertaken is the so-called 'SYNERGY' trial, which is looking into the effects of probiotics in human kidney failure and heart disease. Dr Katrina Campbell, PhD, APD, is the Senior Research Fellow in the Department of Nutrition and Dietics, at the Princess Alexandra Hospital, Brisbane. Dr Campbell explains the aim of this trial on the Australian Traditional Medicine Society website:

'The clinical trial we are undertaking – SYNERGY, which stands for Synbiotics: Easing Renal Failure by Improving Gut Microbiology – investigates the benefits of synbiotic therapy (co-administration of pre- and probiotics) in patients with kidney disease. More specifically, we are looking to see whether

we can improve the health of the gut microbiota, which is disturbed in patients with kidney disease. The disturbed gut microbiota results in an increased production of harmful toxins, which further impacts on the damaged kidneys. Moreover, they are involved in heart disease, which is also very common in people with kidney disease.

Few studies have explored this concept in the past, and to date, translation of their results into clinical practice has been hampered by poor study design. SYNERGY has been designed in a way that provides the highest-quality evidence, overcoming flaws in previous studies, and therefore offering vital insight into the effectiveness of this nutritional therapy for treating kidney disease.'

The results of this wide-ranging clinical study were released in 2016. The opening statement said: 'The generation of key uremic nephrovascular toxins, indoxyl sulfate (IS), and p-cresyl sulfate (PCS), is attributed to the dysbiotic gut microbiota in CKD. The aim of our study was to evaluate whether synbiotic (pre- and probiotic) therapy alters the gut microbiota and reduces serum concentrations of microbiome-generated uremic toxins, IS and PCS, in patients with CKD.'

The conclusion of this study stated: 'In patients with CKD, synbiotics did not significantly reduce serum IS but did decrease serum PCS and favorably modified the stool microbiome.' It seems therefore that the jury is still out and more significant trials are necessary.

Rehmannia Glutinosa (root)

While I am not an avid fan of Chinese remedies of any kind, the use of rehmannia glutinosa root (also known as the Chinese Foxglove) has been around for a very long time. It is now a commonly included ingredient of many homeopathic kidney treatments (such as Kidney Support Gold, Renal Essentials and Natural Pet Kidney Support Plus) and specialized canine kidney specific foods. There is some evidence to support its value in enhancing the immune system, improving renal function, acting as an anti-inflammatory agent and reducing pain and swelling. However, like just about all supplements of this nature, there is no reliable scientific proof to back-up the claims made about it. In rat studies, it seems to cut creatinine levels and improve urine sodium excretion.

Subhuti Dharmananda, Ph.D., Director, Institute for Traditional Medicine, Portland, Oregon suggests this is a useful supplement for kidney deficiency associated with aging. The iridoids (the only active ingredient) may also prevent bleeding, stimulate bile production, protect the liver from damage, and bring high blood sugar down.

Rice Bran

Rice bran is what remains as a bi-product of turning brown rice into white rice. It is very nutritious and abundant in vitamins B1, B3 and B6, iron, manganese, selenium, magnesium and omega-3 oils, as well as health-promoting natural antioxidants and fiber. Rice bran is also one way to help a dog gain weight when it has started to lose it through kidney failure. Moreover, rice bran is a valuable fermentable fiber, which can help with the process of excreting harmful and toxic urea. Urea (a nitrogen-rich waste product) is normally processed by the kidneys, but when the kidneys cannot undertake this job, it builds up and increases the level of toxins circulating in the blood (uraemia).

Salmon Oil

Salmon oil has useful omega-3 fatty acids that supply Vitamin D3. Vitamin D on its own can actually harm a dog in CKF, because one of the substances in it (D2) cannot be processed by the kidneys and therefore stresses them even more. Salmon oil only provides the form of Vitamin D that CAN be processed elsewhere by the dog's body, which means they get an essential substance to help regulate the release of parathyroid hormone (PTH). In turn, this helps reduce the potential for toxic phosphorus crystals to form in a CKF dog's body. When drizzled on food, salmon oil makes some manufactured KD diets more palatable. It is important to use only pure salmon oil and not a product treated with additives. Like all fish oils, salmon oil tends to deplete Vitamin E levels in the canine body, so it is important to add a Vitamin E supplement at the same time as giving this oil.

The recommended dose of omega-3 is 30 mg per pound of body weight. Salmon Oil has almost 1600mg per teaspoon. Using this formula means a 30 pound dog should have no more than half a teaspoon daily to stay within safe limits.

Seaweed

There is much debate about the benefits that seaweed might offer. There is one certainty everyone agrees with ... you should never allow a dog to eat naturally occurring seaweed from the sea or any washed up on the beach. It can swell and block the intestines days and even weeks later, creating the most dangerous of health concerns. There are probably some advantages in seaweed as a clean and cultivated supplement ingredient, particularly as it includes the potential of an all-natural ACE inhibitor. It also has small quantities of potassium, zinc, copper, iron, magnesium, chromium, selenium and a range of vitamins too. Seaweed is also thought to have curative properties that may lessen the symptoms of many ailments, including arthritis.

Use caution when giving this type of supplement to kidney failure dogs, because some seaweed has high levels of calcium and sodium, which are often best avoided. Check with your vet before starting this type of dietary additive and ask their advice about the most suitable supplement brand.

Slippery Elm Bark

Slippery Elm is a herb that is widely considered helpful to both dogs and humans in different ways. It is useful for those with digestive problems, as it contains mucilage and tannins that act as demulcent, emollient, protectorant, and astringent. These help bring relief to sensitive or inflamed mucous membrane linings of the digestive tract and bowels. While it is not a cure for the primary condition and there are no studies proving any beneficial effect on dogs, there is some evidence in humans suggesting it acts to soothe gastric problems (including ulceration and inflammation) and improves the symptoms of constipation and diarrhoea.

It is also said to relieve some respiratory problems, as its lubricating qualities seem to ease coughing and some bronchitic symptoms. There are claims made by some product manufacturers that it helps treat urinary tract infections, but there is no evidence to support this use.

Slippery Elm is a mild form of treatment and it is not known to cause any health concerns. In some more organic forms, the bark can cause allergic reactions in some people (and presumably in some dogs as well). There is a known risk of abortion in pregnant dogs and it is thought to interfere with

some standard medications, so it is important to get veterinary approval is before using. Like many other holistic remedies, there is a lack of reliable research into the benefits of this herb on dogs and – as far as I know – there are no studies whatsoever to prove any beneficial effect on dogs suffering from kidney failure.

Spirulina

Spirulina is a cyanobacterium, once more commonly known as a freshwater blue-green algae. Promotional material suggest it is a beneficial human and animal dietary supplement and is available as a whole food or in flake, powder and tablet forms. It is a rich source of plant enzymes and has a high volume of protein (about 60%), but also has traces of vitamins, minerals, fatty acids and amino acids. Some claim Spirulina is not only a rich source of protein, but it also has nutrients that help boost the auto-immune system, regulate blood pressure, reduce the risk of cancer, lowers cholesterol and relieves seasonal allergies.

Unfortunately, most of the studies conducted that point towards these many benefits are very poor quality, from untested sources or contain unscientific methods. The result is that companies promoting Spirulina as a nutritionally beneficial super-food don't offer any convincing, recognized or approved research studies to endorse the premise.

There are also claims by some sources that suggest Spirulina is helpful in cases of canine kidney failure. For example, DogsNaturally magazine states: "Researchers in Japan found Spirulina significantly reduced kidney toxicity caused by the heavy metal mercury and three pharmaceutical drugs. Other researchers found rats consuming Spirulina or Chlorella algae eliminated seven times the dangerous chemical dioxin compared to a control diet."

But identifying these research studies and quantifying the method and validity of them is nigh impossible, despite a great deal of time and effort spent trying.

My concern with Spirulina is entirely with its exceptionally high protein content, the benefit or detriment of which depends on the source of the product. In addition, Spirulina also has about 17% phosphorus, something that kidney disease dogs need to avoid. Pure organic Spirulina is likely to have high-quality plant protein, which in turn could help a dog's nutritional balance and energy levels. Unfortunately, some companies (particularly those outside Australia and the USA) process the product with preservatives and other chemicals or collect a contaminated source of the product before manufacturing, packaging and distribution. In turn, these dubious sources of Spirulina are very likely to do more harm than good.

But even the protein content has come under suspicion in recent years. The U.S. National Library of Medicine said that Spirulina was no better than milk or meat as a protein source and was about 30 times more expensive per gram.

The digestive system of dogs are not optimized for plant proteins (unlike animal proteins) and it is, therefore, unlikely that many of the micronutrients get absorbed. This means many of the benefits claimed cannot be achieved because a dog's digestive tract simply cannot manipulate Spirulina in an advantageous way. In addition, organic Spirulina is a fairly obnoxious substance that is unpalatable

and can cause nausea. Consequently, it is unhelpful to try feeding this to a dog that is already feeling nauseous due to toxin build-up.

Recently the DSI-EC (Dietary Supplements Information Expert Committee of the USA) undertook a safety evaluation of Spirulina. DSI-EC reviewed information from human clinical trials, animal studies, and regulatory and pharmacopeia sources and analyzed 31 adverse event reports about Spirulina to assess potential health concerns. The problem is that this product has a varied quality control, which means much depends on who has produced it, where it's farmed, how it's made ready for sale, what might be added to it and how it's packaged. All these things can affect the end-product and the quality and potential contamination of it. The FDA has approved it, but only as an ingredient in organic form ... and it has suggested it will likely need to re-evaluate it in due course.

Taurine

Taurine itself is an amino acid containing sulphur and an essential substance in the metabolism of fats. There have been several influential papers produced on human renal failure and the potential benefit Taurine may have in restoring kidney function to an improved state. The Thai Journal of Physiological Sciences published one of the more interesting by Mahmood S Mozaffari in 2003. This study states that 'Taurine is an important regulator of cellular ion transport and osmotic balance, aspects that are pivotal to renal function. The kidneys not only regulate body taurine status, but emerging information also suggests that body taurine status is of consequence for renal function.'

This study also observed that Taurine assists in minimizing protein excretion, thus reducing some stress on the kidneys.

There are no clinical studies that properly and comprehensively explore Taurine supplementation in dogs with kidney failure, but clearly there is a need for research into this subject. It is interesting to note that Taurine is often found as a listed ingredient in energy drinks, because nutritionists believe the muscles release Taurine during exercise and it may need replacing to sustain energy levels. Taurine supplementation is probably more beneficial for vegetarians, because the amino acid is only found in animal tissue. Whether dogs gain any benefit from this substance is uncertain, unless perhaps their diet is almost entirely made-up of vegetables. While Taurine is an essential amino acid that has high concentrations in certain tissues, including heart wall muscles, the retina of the eye, and the brain ... science has yet to fully understand what it does or why it is important.

Your vet will be able to decide if your dog is suffering from Taurine deficiency by undertaking blood and urinalysis tests. If there is a deficiency, they may recommend treating with certain foods or with a supplement designed for dogs.

THC (Tetrahydrocannabinol)

See "Cannabis".

Turmeric

Turmeric is extensively promoted as a beneficial supplement for various human ailments including arthritis, liver problems, jaundice, toothache and menstrual difficulties. Chinese and Indian medicine systems have used it for many years and it has become somewhat of a holistic fad in western

cultures in more recent times. While some in-vitro studies have found the potential of anti-inflammatory and antioxidant effects (primarily from the curcumin compound found in turmeric), these studies only relate to humans and not to dogs. In-vitro studies only suggest a biological effect, but not necessarily an effect that transfers to the complex interactions of the human body – let alone the canine body and its systems.

The only reliable double-blind study conducted on dogs targeted osteoarthritis, because this is one of the most common claims of beneficial effects made by advocates of turmeric. This 2003 study (Randomised, double-blind, placebo-controlled parallel group study of P54FP for the treatment of dogs with osteoarthritis by Innes JF1, Fuller CJ, Grover ER, Kelly AL, Burn JF) concluded there were no significant effects in an objective measure of weight-bearing or in subjective owner assessment, though there was a small difference according to the subjective assessment of investigators. In short, this study showed no significant beneficial effect of turmeric on dogs with osteoarthritis.

One of the big problems with turmeric is that it is poorly absorbed by the gastric system. Large quantities need consuming for compounds to transfer into the circulating bloodstream. These large quantities increase the risk of side-effects and complications including nausea, gastrointestinal upset, changes to blood-clotting abilities, and the potential of an increased risk of gall, bladder and kidney stones. These are adverse effects that could cause a kidney diseased dog's health and wellbeing to decline much faster and are of some significance.

While limited clinical research suggest the risks of side-effects are small, it is right for the owners of kidney failure dogs to consider the potential but largely unproven benefits against the conceivable adverse effects of including turmeric in a supplement regime.

Vitamin B Complex

Vitamin B is another water-soluble vitamin flushed out of the system when extra fluids are given, resulting in the potential for a deficiency. The B vitamins reduce stress and anemia and their loss from the system can have consequences over time. Most processed dog food intended for kidney failure will already have this supplement added to it, so unless you are providing your dog with a homemade diet, further supplementation probably isn't necessary.

Vitamin C

See 'Ascorbic Acid' above.

Watermelon

One of the most important things we can do for CKF dogs is give ample fluids, because this helps flush the harmful toxins out of the system. Watermelon is 90% water and it is also high in fiber and vitamins A and C and is a good source of potassium, which makes it an ideal addition to the diet. However, watermelon is also a natural diuretic, which means unless your dog is struggling to urinate, it should only be given occasionally. Note that the seeds and skin are toxic to dogs, so don't give these parts of the fruit. Too much watermelon can also lead to diarrhea and stomach upset, so be cautious in the amounts given.

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