

Dietary food for the targeted tackling of bladder and kidney diseases in dogs and cats



My dog or cat has a bladder and/or kidney problem... what do I do now?'



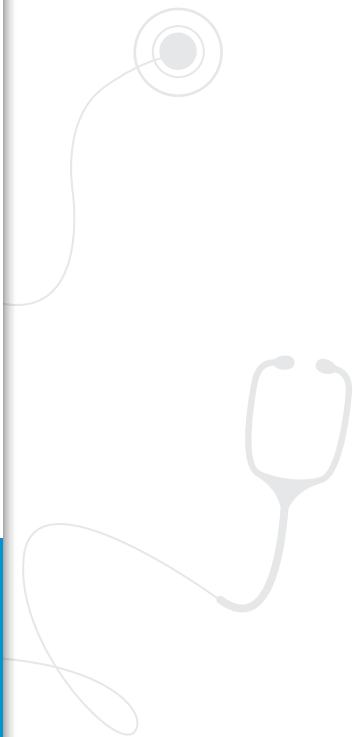
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Veterinary exclusive



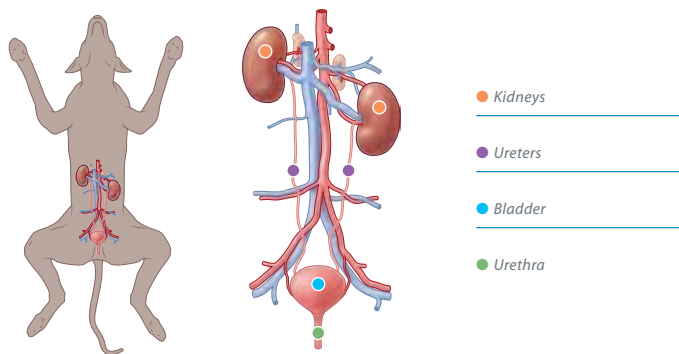
Urinary tract problems are common in dogs and cats. When your dog or cat has bladder or kidney problems, a proper treatment is essential. Based on an examination, the veterinarian is able to determine which condition your pet has.

In the treatment of kidney and bladder problems, nutrition often plays a central role. This brochure clarifies the causes and treatment of bladder and kidney problems and what role TROVET nutrition can play in this.

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The urinary tract is responsible for the production and excretion of urine. When we talk about the urinary tracts, we distinguish between the 'upper urinary tract' and the 'lower urinary tract'. The kidneys belong to the upper urinary tract. The ureters, bladder and urethra belong to the lower urinary tract.



Causes of bladder problems

Bladder problems can have several causes. In 64% of the cases, bladder problems in cats are caused by Feline Idiopathic Cystitis (FIC). This is a non-infectious bladder inflammation with an unknown cause. However, it is known that stress and insufficient water intake play an important role. In dogs, 40% of the cases of bladder problems are due to a bladder infection. Of these, half is caused by bacteria. In cats, only 1% of the bladder infections are caused by bacterial infections. An important cause of bladder and kidney problems in dogs and cats is the formation of crystals and/or stones.

What are bladder and kidney stones?

Bladder and kidney stones can be formed in the urine of dogs and cats when it has a high concentration of minerals. The urine will have a dark (yellow) colour. When there are too many particles in the urine, these may coalesce and form crystals. These crystals can form into bladder and kidney stones. There are different sorts of bladder and kidney stones, including calcium oxalate, cystine and urate stones.

Symptoms of urinary tract problems

Bladder stones usually have different symptoms, depending on the underlying cause, size and location of the formed stones. For example, stones with a sharp surface are able to cause damage to the bladder wall. When the formed stones get stuck in the urethra, this may cause life-threatening symptoms. Therefore it is important to recognise the symptoms that may indicate a possible urinary tract problem.

The most common symptoms of bladder stones:

- > Blood in the urine
- > Many small amounts of urinations
- > Painful urination
- > Pressing during urination
- > Incontinence (urine leakage)
- > Abnormal colour and/or odour of the urine
- > Behavioural changes such as restlessness, lethargy and refusing food. Next to this, there may be changes such as urinating in the house or in places other than normal.

Making the correct diagnosis

To start a proper treatment, it is essential that your veterinarian determines the type of bladder or kidney stone in your pet. All different stones or crystal types require a different treatment. After physical examination, your veterinarian may therefore proceed with the following additional tests:

Urinalysis

Your veterinarian usually analyses the acidity (pH) of the urine and the presence of bacterial infections. Afterwards, your veterinarian performs a microscopic examination to check the presence and type of crystals in the urine of your pet.

X-rays

X-rays can confirm whether your pet has bladder or kidney stones and determine the location of the stones. However, not all bladder and kidney stones are visible on an x-ray.

Bladder and kidney stone analysis

By analysing bladder or kidney stones, it is possible to determine the components of which the stones are made. Based on this analysis, the appropriate treatment can be selected.

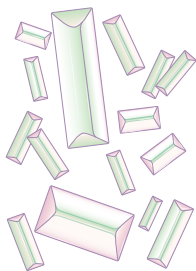
What is struvite?

The most common bladder and kidney stones in both the dogs and cats is struvite. Struvite is formed from particles of magnesium, ammonium and phosphate. In severe cases, these stones can even clog the urethra, resulting in an inability to urinate. This life-threatening situation is sometimes seen in cats.

Struvite formation

When the urine has become too concentrated with the magnesium, and ammonium phosphate particles, struvite crystals may occur. This can have several causes. Next to mineral concentration, also acidity of the urine plays a significant role.

By nature, dogs and cats excrete acidic urine, which is relatively rich in the struvite forming components, such as magnesium, ammonium and phosphate. However in this acidic urine struvite crystals cannot form and the dog or cat will have no problems. A higher urine pH may promote the formation of struvite crystals. This can happen when your pet has a bladder infection. As a result, the chance of struvite formation increases.



Struvite crystals

It may also be the case that your pet is drinking too little, so that the kidneys form urine with a relatively large number of particles in a little amount water.

Compare the urine of your pet with a cup of tea. One spoonful of sugar dissolves easily.



When adding three scoops of sugar and stir vigorously, the sugar will dissolve with some difficulty.



Five spoons of sugar will be unable to dissolve in the tea. In the urine, magnesium, ammonium and phosphate coalesce to form struvite crystals, which precipitate at high concentrations.



Factors that may play a role in the formation of struvite

Water intake

A dog or cat that drinks too little water produces more concentrated urine. This increases the probability of bladder and kidney stones formation.

Urine properties

Crystals can only form when the concentration of crystal-forming components is sufficiently high and when the urine pH 'favourable' is for crystal formation. The favourable urine pH is different per stone type. So for preventing stone formation, a diet should be fed that ensures a low amount of crystal-forming components in the urine and a urine pH which is unfavourable for crystal formation. In the prevention of struvite, the urine has to be made acidic and a surplus of magnesium and phosphorous intake should be prevented. Also, a reduced amount of dietary protein prevents a potential excess of the ammonium waste product in urine.

Urinary tract infections

Urinary tract infections are able to raise the urine pH, which promotes the formation of struvite crystals and stones.

Nutrition

Food that provides a low urine pH and contains a lower mineral content (magnesium and phosphorous), reduces the risk of the struvite formation.

Age, breed en gender

In cats struvite often occurs at a younger age and castrated males seem to be most prone to the formation hereof. The factors that affect stone formation, as well as treatment, vary widely per animal. For a rapid recovery it is recommended to follow the advice of your veterinarian.

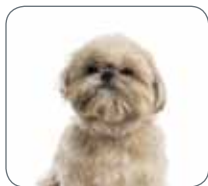
In dogs struvite is more common in smaller breeds, such as miniature schnauzer, miniature poodle and Shih Tzu.



Miniature schnautzer



Miniature poodle



Shih Tzu

Treatment and the role of nutrition

The examination of your veterinarian has determined what kind of crystals or stones it comes to your dog or cat. Based on these results, the necessary follow-up treatments will be chosen:

- > Removal of the bladder or kidney stone by means of surgery
- > The use of antibacterial medications to combat urinary tract infections
- > Providing a dietary food that contributes to reducing and/or solving the problems

Nutrition has a large influence on the composition and acidity of the urine. When a diet is rich in the struvite forming particles magnesium, phosphorous and protein, relative high amounts of these substances have to leave the body via the urine. Hence, nutrition plays a central role in both the treatment and the prevention of struvite in dogs and cats.

Water intake

Because bladder problems are also caused by a shortage of water intake, canned food can be an important contribution in the prevention of struvite. Ways to stimulate fluid intake is by using a drinking fountain or allow favourite drinking spots.

TROVET Urinary Struvite | ASD

Urinary Struvite is dietary food, specially formulated to prevent the formation of struvite crystals. Struvite is a common but well treatable condition. Urinary Struvite lowers the urine pH, preventing the formation of struvite crystals. In combination with the lowered mineral content (magnesium), the reoccurrence is further reduced.



TROVET Urinary Calm | UCD, for cats

Urinary Calm is a diet for cats and has been developed, inter alia, for the prevention of struvite crystal formation. In order to minimise bladder and kidney stone formation, Urinary Calm acidifies the urine to a pH between 6.0 and 6.4.

Urine volume has the greatest effect on the formation of all bladder and kidney crystals, in which a large urine volume reduces the chance of crystal formation. The sodium level is slightly increased to promote water intake and increase urine volume.

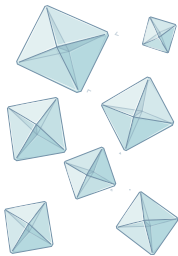


What is oxalate?

Oxalate is formed by the body itself, but can also be absorbed in small amounts from foods containing vegetable raw materials. For the body, oxalate is a waste product, which is excreted by the kidneys.

The occurrence of calcium oxalate

When oxalate binds to calcium, calcium oxalate crystals form. The chance of calcium oxalate crystal formation increases as the urine becomes more acidic, however, calcium oxalate can also be formed in less acidic urine. Calcium oxalate crystals that precipitate in large quantities will eventually form calcium oxalate stones. Precipitation of crystals is increased in highly concentrated urine.



Calcium oxalate crystals

Calcium oxalate a multifactorial problem

The underlying causes for the occurrence of calcium oxalate have so far not been fully clarified. Many factors seem to be of influence, including:

- > Mineral concentrations of the urine
- > Breed
- > Gender
- > Age of the animal
- > Nutrition
- > Disease processes in which the excretion of calcium in the urine has been increased

These factors make this type of stone more difficult to avoid than struvite.

Treatment and the role of nutrition

Calcium oxalate can still not be treated solely with dietary measures. Once calcium oxalate stones are formed, the surgical removal of the formed stones is the only way to treat the condition. The role of nutrition is to prevent the formation of this type of crystals and stones.

Citrate is a substance which is able to bind to calcium. As a result, oxalate can no longer bind to calcium. This reduced the chance of calcium oxalate formation. Citrate also contributes to the neutralisation of the urine pH, and lowers calcium excretion by the body. Although the formation of calcium oxalate is relatively independent of urine pH, a neutral urine pH is targeted in preventive diets. A deficiency of vitamin B₆ can increase oxalate production. A high content of vitamin C can stimulate the formation of oxalate.

TROVET Renal & Oxalate | RID

Renal & Oxalate dietary food is specially designed to reduce the formation of calcium oxalate. The use of potassium citrate has a urine pH-increasing effect, which reduces the excretion of calcium in urine. In addition, citrate is able to bind calcium, which can reduce the occurrence of calcium oxalate formation in urine. Renal & Oxalate also contains plenty of vitamin B₆, preventing oxalate formation caused by vitamin B₆ deficiency.



TROVET Urinary Calm | UCD, for cats

Urinary Calm has been developed, inter alia, for the prevention of calcium oxalate formation and the reduction of relapses.

The formation of calcium oxalate is slightly influenced by urine pH, but urine pH has a more profound effect on struvite formation. For this reason, it has been decided to formulate the diet to have an acidifying effect on the urine.



Oxalate formation by the animal itself has a great effect on oxalate excretion and therefore calcium oxalate. For this reason, oxalate forming ingredients, such as wheat, oats and animal products with high collagen content, have been avoided. Urine volume has the greatest effect on the formation of all types of bladder and kidney crystals, in which a large urine volume reduces the chance of crystal formation. The sodium content is slightly increased to promote water intake and increase urine volume.

What is Feline Lower Urinary Tract Disease (FLUTD)?

The acronym FLUTD is used as a collective name for bladder and urinary disorders in cats. Urolithiasis (bladder and kidney stones) and Feline Idiopathic Cystitis (non-infectious bladder inflammation of an unknown cause) are the most common diseases within FLUTD.

Phenomena that occur in cats with FLUTD are:

- > Excessive attempts to urinate (often small amounts at a time)
- > Urinating outside the litter box
- > Painful urination (agonising meows during urination)
- > Dark or red coloured urine (blood in urine)
- > Licking the genitalia

Feline Idiopathic Cystitis (FIC)

Cystitis results in damage to the bladder wall. Crystals are able to bind more easily to a damaged bladder wall than to a healthy bladder wall. These places can be considered as starting points for stone formation. Preventing or curing FIC helps to reduce bladder stone formation.

Stress plays an important role in the occurrence of FIC. Some cats are more susceptible to stress than others, due to differences in personality. FIC often develops in cats that stay outside a lot during the summer and are kept inside during the winter. These cats are accustomed to freedom and avoiding stressful situations. The arrival of a baby or new pet, and the absence of adequate shelter places, can also cause anxiety in cats. When cats get into a stressful situation, the 'fight or flight system' will be activated. During a stress response, blood adrenaline and cortisol increase, which causes the organs responsible for flight or fight to be supplied with extra oxygen and energy.

When this happens, the immune system gets a low priority and the body's defence will be put on the back burner. These stress situations are normally short-lived. However, this is not the case when a cat is not able to avoid the situation and will feel uncomfortable for a long time. Prolonged suboptimal functioning of the immune system will inevitably result in health problems.



Confrontation cats

Treatment and the role of nutrition

Struvite and calcium oxalate

Struvite and calcium oxalate are the most common bladder and kidney stones. In the worst case, they may block the urethra, which can be fatal when left untreated.

Special dietary foods for cats can provide a solution to prevent the development of both struvite and calcium oxalate. The most important aspect is to reduce the concentration of minerals in the urine. This is possible by means of the lowering the amount of minerals in the food and thus minimising the mineral excretion via the urine. By encouraging water intake, the urine volume increases, making the urine less concentrated and reducing the risk of stone formation. In order to minimise the formation of bladder and kidney stones, it is also important to create the correct urine acidity (pH between 6.0 and 6.4). Acidic urine has a much smaller effect on the development of calcium oxalate, than basic urine has on the development of struvite.

Stress

Stress plays an important role in the development of FIC. Stress can be avoided by making your cat feel at ease inside the house.

Cats feel at ease when they have plenty hiding places. It is best if these places are elevated and provide shelter.

Keep the litter box clean and make sure it is large enough. In some cases it is desirable that several boxes are placed in the house.

Cats like it when there are multiple feeding places. **It is important that a cat can eat quietly.** If you put food bowls at multiple (sheltered) places, the cat

will have the opportunity to decide where to eat. Because nutrition plays a very important role in the health of the urinary tract, the veterinarian will recommend feeding a special dietary food.

Finally, there are nutraceuticals with a calming effect, which can be added to special diets. These nutraceuticals help to reduce the stress level of your cat.



Eating in a group may cause stress

TROVET Urinary Calm | UCD, for cats

Urinary Calm is specially formulated for adult cats to prevent (reoccurring) struvite and calcium oxalate formation and to reduce stress.

To help reduce stress and the risk of Feline Idiopathic Cystitis (FIC), three ingredients are added to TROVET Urinary Calm: green tea extract, milk protein hydrolysate and tryptophan.

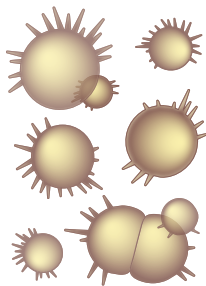


What is urate?

It is estimated that five to six per cent of all bladder and kidney stones occurring in dogs and cats comprises of urate. Urate is the unofficial name for crystals composed of ammonium and uric acid. A too high concentration of ammonium and uric acid in the urine can result in crystal formation. The official name is ammonium urate.

The development of urate

Ammonium is a waste product produced during protein metabolism and is largely converted to urea and excreted via urine. Uric acid is produced in animals by the degradation of purines. When too much uric acid and ammonium is produced, or when the uric acid or ammonium excretion is insufficient, it can accumulate in the body. When a surplus of ammonium and uric acid is present in the urine, ammonium urates can develop. This may be caused by the composition of food or by insufficient water



Ammonium urate crystals

intake. A low urine pH increases the chance of ammonium urate occurrence.

The liver converts the waste product ammonia into urea, which leaves the body via the urine. In some liver problems, the conversion of ammonia to urea is not optimal and more ammonia will end up in the urine. This increases the chance of ammonium urate formation.

In Dalmatians, genetic factors play an important role in the formation of urates. The liver of Dalmatians is unable to efficiently convert uric acid into an easily dissolvable substance that can be excreted via the urine. Dalmatians fed a purine-rich food will accumulate a large amount of uric acid in the urine, which increases the amount of uric acid available for binding with ammonia, resulting in more ammonia urate formation.

Treatment and the role of nutrition

In the case of ammonium urates, a urate dissolving diet is sufficient to remove the stones, but often surgical intervention is required. Since urates are formed from the purine metabolism, urate-preventive diets contain low levels of purines. This can be done by reducing the protein content or by avoiding purine-rich raw materials such as fish and organ meats. In diets for dogs, vegetable proteins may be used as a substitute of animal protein. Additionally, urates form more easily at a low urine pH. A diet that causes a higher urine pH is preferred. Extra water absorption dilutes the urine, resulting in relatively fewer 'stone-forming particles' in the urine. This can be achieved by feeding canned food or by formulating the diet in such a way that water intake is stimulated.

TROVET Renal & Oxalate | RID

The combination of a low protein content, a slight pH raising effect on the urine and the use of a relatively large proportion of vegetable raw materials, makes Renal & Oxalate dry food for dogs a suitable diet for the prevention of urate stones. Renal & Oxalate canned food additionally has a diuresis enhancing effect.



TROVET Exclusion | NVD, for dogs

Exclusion is a vegetable dietary food for dogs. The absence of animal purine-rich raw materials can prevent the formation of urates. Exclusion has a vegetarian hallmark.

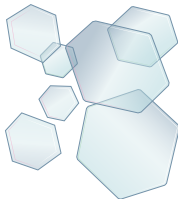


What is cystine?

Cystine is an amino acid that is taken up in the body through the diet. Wheat and maize, but also animal protein, such as eggs and fish are rich in cystine.

The development of cystine

It is estimated that one to three percent of all stone types, found in the bladder of dogs, are cystine stones. For cats this is less than one percent. If the kidney is unable to absorb sufficient cystine from the urine, this may cause problems in the bladder. The lack of absorption of cystine back into the kidney is caused by a genetic disorder.



Cystine crystals

Treatment and the role of nutrition

Cystine can be treated with a cystine dissolving diet. In addition, medication may be given in order to increase the solubility of cystine. In many cases, surgical removal of these stones is chosen. Because the kidneys absorb insufficient cystine from urine, the level of cystine in the food should be as low as possible. This can be done by lowering the dietary protein content or by making limited use of so-called sulphur-containing amino acids. Plant products are relatively poor in these amino acids. Cystine dissolves the best in urine at a pH of around 7.5. Preference is given to a diet which raises the urine pH to this value. Extra water absorption dilutes the urine, resulting in relatively fewer 'stone-forming particles' in the urine. This can be achieved by feeding canned food or by formulating the diet in such a way that water intake is stimulated.

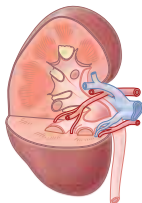
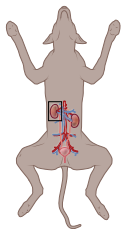
TROVET Renal & Oxalate | RID

The combination of low protein content, a slight urine pH-raising effect and the use of a relatively large portion of vegetable raw materials, makes Renal & Oxalate a suitable diet for the prevention of cystine stones. Using Renal & Oxalate canned food results in an increased water intake, a decreased urine mineral concentration and better flushing of the bladder and kidneys. Renal & Oxalate has a safe low protein content.

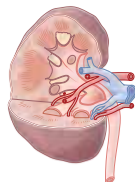


Chronic kidney disease

Chronic kidney disease is a common disease in ageing dogs and cats. The cause of chronic kidney disease is a slow wear and tear of the kidneys. About thirty percent of the geriatric cats have an impaired renal function. In geriatric dogs this is around ten percent. At the time the veterinarian determines that your dog or cat has kidney problems, it is very important to provide proper nutrition.



Healthy kidney



Damaged kidney

When does your pet have chronic kidney disease?

The kidneys filter and remove waste products from the blood. The kidneys also play an important role in fluid and mineral balance. Due to the large reserve capacity of the kidneys, problems in carrying out these functions only occur when more than three quarters of the kidneys are damaged. Waste products, which are mainly derived from protein degradation, accumulate in the body and cause the symptoms of kidney problems. One of the first problems often observed in dogs and cats is more drinking and urinating. As the renal function deteriorates, the animal will feel sick, become lethargic and possibly starts vomiting. Because of the poor appetite, weight loss occurs and the coat condition deteriorates.

What causes chronic kidney disease?

The kidneys have a large reserve capacity, which causes symptoms to occur when a large portion of the kidney tissue has been affected. The damage to the kidneys may have occurred a long before the first symptoms are seen. This makes it difficult to find out what caused the kidney to fail. Regardless of the primary cause of the chronic renal injury, the final stage reveals itself in the same way and the treatment of the symptoms is similar.

Possible causes of kidney disease:

- | | |
|-----------------------------|-------------------------------|
| > Virus infection | > Abnormal blood pressure |
| > Bacterial infection | > Poisoning |
| > Kidney stones | > Certain types of medication |
| > Hereditary kidney disease | > Wear due to age |
| > Tumours | |

Symptoms chronic kidney disease:

- > Loss of appetite: poor appetite for food and even snacks
- > Slimming: due to decreasing fat stores and muscle mass
- > More drinking and urinating: drinking more than usual and urinating large quantities or sometimes even no bladder control
- > Vomiting: throwing up food, bile or mucus
- > Poor coat: the shine disappears and/or shedding of your pet
- > Bad breath: remarkable malodour from the mouth
- > Dehydration, the skin does not regain smoothness when you create a fold, the nose can be dry
- > Slower, more sleep: lethargy and increased need for sleep

In chronic kidney disease, a complete recovery of the kidneys is not possible. However, it is possible to slow down the disease progression by means of special dietary foods. One of the most important properties of such a dietary food is a lower phosphorous level, in order to slow down the progression of the kidney wear. In addition, a lower protein content reduces the accumulation of waste products in the body.

Making the correct diagnosis

A first impression of the kidney function can be given by inspecting the urine. The veterinarian can determine if a dog or cat drink a lot or a little. If the urine leads to further investigation, it is advisable to do a blood test. During a blood test, the veterinarian looks at the amount of waste products in the blood, by measuring urea and creatinine. When the kidney function is reduced, these waste products can accumulate in the blood.

When the blood test shows that your pet suffers from chronic kidney disease, your veterinarian will make a treatment plan. Kidney failure is a complicated disease. This is because the kidneys regulate many different bodily functions, which may be affected differently in each dog or cat. A unique treatment plan has to be made for each individual animal.

Treatment and the role of nutrition

A kidney diet is the basis of the treatment of dogs or cats with kidney failure. The most important properties of such dietary foods is to have a low phosphorous level to help to slow down the progression of the kidney wear and a lower protein content in order to reduce the waste accumulations in the body. When the waste products in the blood are slightly elevated, a kidney diet is usually sufficient. When the waste products are severely elevated, the dog or cat has a decreased appetite, regularly vomits and/or rapidly dehydrates, medication is given in combination with the renal diet. This medication reduces the symptoms resulting from the reduced functioning of the kidneys. These medicines include antiemetics, appetite stimulants and anti-hypertensives.

TROVET Renal & Oxalate | RID

Renal & Oxalate is specially formulated to meet the requirements of dogs and cats with chronic renal failure. The diet is limited in protein and phosphorous, which prevents the accumulation of waste, reduces the stress on the kidneys and ultimately slows down the progression of renal failure. The proteins used are of high quality, in order to meet the amino acids requirements, without leading to excess waste products. Renal & Oxalate's energy density reduces food volume, to help animals with a loss of appetite to meet their daily energy requirement.



Fluid balance

In chronic renal failure, the kidneys are less able to concentrate the urine and regulate the fluid balance. This is also the reason that patients with chronic renal failure drink excessively and urinate more frequent. It is important to provide sufficient drinking water. Sometimes dogs and cats with chronic renal failure will dehydrate, even when enough water is provided. In lightly dehydrated patients, treatment with a subcutaneous infusion is often sufficient. Severely dehydrated patients are usually treated with an intravenous infusion in the leg. This way the infusion fluid directly enters the bloodstream and restores the fluid balance in the body, giving it the possibility to excrete waste products.



TROVET Treats

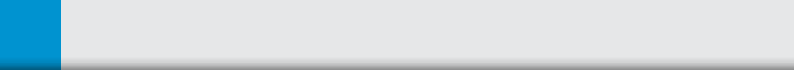
TROVET has an extensive range of responsible rewards, also known as treats. Most treats are suitable for both healthy dogs and cats, as well as dogs and cats with a special dietary requirement or prescription diet. The TROVET treats are cookies in different shapes and are an ideal reward that can be used during training, after a walk or just as a snack.

The special thing about TROVET treats is that, besides the taste, they are formulated in such a way that they fit well with various diets. Giving 'regular' treats to dogs or cats that get dietary food, can negatively affect the efficacy of these foods. Therefore, carefully choose a treat that fits the situation of your dog or cat. Always ask your veterinarian for more information and advice. TROVET treats are available exclusively via your veterinarian.

For pet owners, there is a more detailed treat brochure 'I want to give my dog or cat something extra besides dietary food... what do I do now?'. You can find these at your veterinary practice or at www.trovvet.com.



Notes

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reliable and affordable dietary pet food

For the complete range of TROVET
products, visit: www.trovvet.com



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De Vergert 4 - 6681 LE Bommel - The Netherlands

T: +31 (0)481-470240 | E: info@trovet.nl | W: trovet.com