

## **Bladder Stones and "Sludge"**

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Pet rabbits are commonly affected with urinary stones or more properly "calculi." These calculi present themselves in two common forms: as large stones (at times reaching sizes more than an inch in diameter) and as very small sand or crystals (smaller than a grain of sand). The small calculi are typically present in large numbers and are collectively referred to as "calciuria," "sand" or "sludge."

Urinary calculi are a disappointing problem in the pet rabbit as they are difficult to treat effectively and the problem commonly recurs.

The exact cause of calculi formation is poorly defined. Both urinary tract infection and the contribution of a high calcium diet are strongly suggested. Other contributing factors include any change in the rabbit that makes it difficult to completely empty his bladder. These include neurological problems such as disc disease or back trauma, abdominal adhesions related to the castration or spaying of the rabbit, inguinal hernias and congenital abnormalities of the bladder. Some cases may be related to a behavior of not urinating frequently (such as a rabbit who will not urinate in his cage and thus goes all night without urinating).

Signs of calciuria in the rabbit are poor appetite or anorexia, frequent and sometimes painful, straining urination and, in some cases, the passing of sand-like stones. The bunny may be reluctant to move, have a hard or painful abdomen and "hunched-up" posture caused by a painful, overly distended bladder. A sandy urine precipitate may be found on the fur between the legs, on the tail or seen where the rabbit has urinated.

The diagnosis of calciuria in rabbits is made by the veterinarian using a combination of urinalysis, abdominal radiographs, stone analysis, urine cultures and blood tests. Urine for urinalysis should be collected just before it is examined and is best collected into a sterile syringe using a urinary catheter or by "cystocentesis" where a syringe needle is passed through the abdominal wall into the bladder. In this way the urine is not contaminated by bacteria in the urethra or from the substrate, if the rabbit urinates normally. Cultures taken from the urine should be performed before any antibiotics are given to maximize the chance of finding the bacteria responsible for the infection. Radiographs (X-rays) will tell the veterinarian if the stones are limited to the bladder or if the patient has stones in the kidney(s) or ureter(s) as well. Stones in the kidneys or ureters present a much worse situation.

Stone analysis helps the veterinarian determine the underlying cause of the stone formation. In most cases there is an underlying bladder infection that must be completely corrected to prevent the stones from returning. In other cases, the stones may be related to very high levels of calcium in the rabbit's diet or to other metabolic abnormalities.

The most important aspect of treatment for a rabbit with urinary calculi is to remember that calculi are a symptom of an underlying problem, much like a cough is a sign of an underlying respiratory tract

disease. Stones or sludge calculi must be removed surgically or flushed from the bladder and the rabbit started on appropriate antibiotics. Correction of the underlying problem may also involve changing the diet to remove sources of excess calcium and management changes that facilitate frequent and complete urination. Treatment may also involve supportive care, such as hospitalization for fluid therapy.

Prevention of urinary tract calculi is best accomplished by assuring good urinary tract health through proper hygiene. Equally important is replacing or diluting high-calcium foodstuffs in the diet. This includes alfalfa hay and alfalfa-based pellets.

Rabbits absorb calcium efficiently from their gut in proportion to the calcium concentration in the diet. Therefore, high blood calcium concentrations (12-16 mg/dL) are commonly found in rabbits on a calcium-rich diet, such as alfalfa.

The primary way for the rabbit to control calcium concentrations is through excretion of calcium into their urine. It is therefore important to assure adequate water intake so that urine is not concentrated. A safe, private location for the rabbit's litter box as well as frequent periods and adequate space for exercise all help to increase the frequency of urination.