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## G79-465 Urinary Calculi (Waterbelly) in Cattle and Sheep

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## Urinary Calculi (Waterbelly) in Cattle and Sheep

This publication discusses the symptoms, management and treatment of various types of urinary calculi diseases in cattle and sheep.

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The term "urinary calculi" refers to deposits in the urinary tract. These deposits may block the flow of urine, particularly in male cattle and sheep. Prolonged blockage generally results in rupture of the urinary bladder or urethra, releasing urine into the surrounding tissues. This produces the condition commonly referred to as "waterbelly."

Two types of urinary calculi, both mineral in nature, predominate in cattle and sheep: (1) the phosphatic type formed principally under feedlot conditions and (2) the siliceous type occurring mainly in range animals. Other types of calculi can also occur.

### Symptoms

Animals afflicted with urinary calculi may appear restless with frequent straining in unsuccessful attempts to urinate. Responses to extreme pain include tail wringing, stamping the feet, and kicking at the abdomen. In cases where urinary blockage is not complete, urine may dribble slowly from the sheath. Upon failure to pass the stone and after complete blockage of urine flow, the bladder or urethra finally rupture, releasing urine into the body cavity and surrounding tissues.

Animals with urethral rupture accumulate urine with swelling of the lower abdomen. Urinary bladder rupture results in urine accumulation in the abdominal cavity with fullness of the abdomen gradually developing. At these stages, animals may show loss of appetite and stand quietly or lie down, being reluctant to rise. Death follows. Post-mortem examination of animals with a ruptured bladder generally reveals blood-tinged fluid in the body cavity, severe infection in the abdominal cavity, inflammation of the urinary tract, and a hemorrhagic condition at the point of rupture. One or more stones can often be located at the point of blockage.

## **Phosphatic Urinary Calculi**

### ***Causes***

Calculi formed under feedlot conditions are commonly composed of phosphates of calcium, magnesium, and ammonium. Phosphatic calculi are caused by nutritional conditions that promote the production of urine that is alkaline and has a high phosphorus content. The concentrate feedstuffs, such as grains, oil meals, etc., normally fed at high levels to feedlot cattle and sheep, often provide levels of phosphorus in excess of the 0.18 percent while approximately .3 percent is required for optimum weight gains. These concentrate feedstuffs are usually low in calcium content. Both of these factors, the high phosphorus level and the calcium-phosphorus imbalance, tend to promote high urinary phosphorus excretion.

Urine of cattle or sheep is normally alkaline, and the extent that a given feed contributes to urine alkalinity cannot be surmised from the initial acidity or alkalinity of the ration ingredients. The acids associated with plants or plant fermentation products (corn silage, high moisture corn, etc.) are metabolized in the body and do not reach the urine. Most forages contribute toward an alkaline urine, cereal grains have little influence on urine pH and feeds having a high content of natural protein (soybean meal, alfalfa, etc.) contribute some degree of acidity to urine pH.

### ***Prevention***

Most materials and practices offering some degree of protection against phosphatic urinary calculi appear to result in at least one of the following: (1) a lowering of urinary phosphorus levels; (2) acidification of the urine; and (3) an increase in urine volume.

To maintain low urinary phosphorus levels, rations high in dietary phosphorus should be avoided and a calcium to phosphorus ratio of less than 6:1 should be maintained. To obtain calcium to phosphorus ratios in this range, it is generally necessary to supplement high-concentrate finishing rations with 1.5 percent to 2 percent ground limestone (a source of calcium). You may reduce this amount by one-half if the ration contains as much as 20 percent of a good quality legume forage. Calcium supplementation in finishing rations is usually achieved by feeding protein supplements that contain 8-10 percent calcium.

Acidification of the urine may be achieved by the feeding of acid forming salts. It is recommended to supplement ammonium chloride daily at a rate of 0.25 oz. to sheep, or 1.0 to 1.5 oz. to finishing cattle.

Urine volume may be increased by including salt at a level higher than normal in the diet. Levels up to 4 percent of the total diet have been used for this purpose. An increase in urine volume is dependent upon increased water consumption, and the importance of an adequate water supply is obvious.

It is recommended that phosphorus levels and calcium to phosphorus ratios, as previously outlined, be controlled in a feeding program. Use of ammonium chloride should be considered when ration changes involving phosphorus and calcium have not achieved desired results. An increase in urine volume

through the feeding of a high level of salt has proved to be the least effective of the preventative methods for phosphatic urinary calculi. However, it is sometimes used as an adjunct to practices that reduce urine phosphorus.

## **Siliceous Urinary Calculi**

### ***Causes***

Urinary tract deposits of this type are seen most often in animals grazing the western ranges, but they occasionally occur in animals that are confined and fed feeds such as grass hay, oat straw, and oats. Mature range grass, non-legume grass hay, oat straw and oat hulls generally contain three to seven percent silica.

### ***Prevention***

Silica absorbed from the diet is rapidly excreted in the urine. Methods for the prevention of siliceous urinary calculi involve changes in the nutrition of the animal to reduce silica intake, or to increase water consumption thereby diluting urinary silica. Limited data suggest that adequate phosphorus supplementation that results in increased urine acidity may be beneficial.

Feeds having a low silica content may be used to reduce silica intake. These include alfalfa and other legume forages, and low-fiber cereal grains such as corn and milo. Substituting low-silica feeds for as much as one-half of the ration would be expected to greatly reduce, if not eliminate, the formation of siliceous urinary calculi.

High levels of salt in the diet have been used to increase water consumption and urine volume. Levels of salt in the range of 20 percent to 50 percent of a grain or protein supplement, or approximately 4 percent of the total ration, are sometimes used for this purpose. Successful reduction of siliceous urinary calculi incidence through the forced feeding of salt is dependent upon an adequate supply of quality drinking water, and use of this method is not recommended in areas where drinking water is known to have a high salt content.

## **Other Causes of Urinary Calculi**

Oxalates, carbonates, protein containing compounds, and others have been found in stones from animals, however, stones from those compounds occur less frequently than phosphatic and siliceous stones. Some plants such as Halogeton tend to be oxalate accumulators, increasing risk to animals grazing large amounts of these plants.

Prevention options should address specific types of stones found in affected animals.

## **Management**

Programs designed for prevention of urinary calculi have yielded disappointing results when initiated after the problem has already developed. While a calculi-prevention program may reduce the formation of additional deposits under these conditions, some losses may continue to occur from stones previously formed. In some cases stone analysis may be beneficial for prevention and treatment. Grazing heifers rather than steers may be a logical option in high incidence areas.

## **Hard Water is Not Involved**

In instances of urinary calculi outbreaks, attention is often focused upon the source of drinking water. However, assuming an adequate supply of potable water, there is no reason to suspect that the water may be a contributing factor. Further, the minerals (calcium and magnesium) contributing to water "hardness" are among the factors found to be protective against phosphatic urinary calculi.

## **Treatment**

Treatments designed to facilitate passing or dissolving the deposits have generally met with limited success. Surgery represents the most effective treatment, with the stone(s) being removed at the point of blockage. In rams, the point of blockage is often the filamentous urethral process at the end of the penis. In this instance, the urethral process and the accompanying stone may be surgically removed.

In steers, the urethra and penis may be bisected and brought to the outside of the body to bypass the constricted portion of the tract. Steers treated in this manner often make acceptable weight gains for the remainder of the feeding period. Other surgical interventions, such as catheterization, have also been used. These operations require the skill of an experienced veterinarian. Economics rarely allow its application to sheep.

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