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Urinary Calculi in Sheep and Goats

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Formation of calculi (stones or crystals) within the urinary tract of sheep and goats is common and primarily a metabolic disease. The most common calculi found in lambs and kids on high-concentrate diets is the struvite type, which contains calcium, magnesium and ammonium phosphates. The mineral composition of drinking water, in conjunction with mineral imbalances in the diet, probably contributes more to the initiation of calculi formation than does the lack of water itself.

Castration of young kids and lambs removes the hormonal influence necessary for full development of the urinary tract. Consequently, the problem most frequently occurs in lambs/kids being managed for livestock shows. The sigmoid flexure and urethral process of lambs and kids are the most common sites for calculi to lodge. Irritation of delicate urethral lining at the calculi lodging site causes inflammation and restriction, thus blocking urine flow through the urethra. Retention of urine, abdominal pain and distention and rupture of the urethra or bladder are associated with this condition. A significant number of cases result in death of the animal.

What to look for if you suspect Urinary Calculi:

1. Abdominal discomfort. Wethers are restless, kick at their belly and make frequent attempts to urinate. If hand fed, animals may not charge the trough with the group at feeding time.

2. Attempts to urinate are often accompanied by rapid twitching of the tail. Animals may also groan or bleat while attempting to urinate. Grinding or gritting the teeth while resting is also an indication of pain.

3. Before complete occlusion of the urinary tract, urine may dribble from the urethra, dry on the preputial hair, and leave mineral deposits.

4. Palpation of the penis and urethral process may reveal significant hypersensitivity, distension and/or swelling.

Prevention

As is the case with many health problems, prevention of this condition is much easier and more effective than attempts at treatment. The following are offered for consideration in the development of a urinary calculi prevention program:

1. Delay castration of young lambs/kids as long as possible.

2. Clean, cool water is a must. Clean enough that you would drink from the trough.

3. A ration with at least a 2:1 calcium to phosphorus ratio greatly reduces the incidence in feeder animals.

4. Addition of 3-4% salt in the ration stimulates water intake and has thereby proved beneficial.

5. Ammonium chloride should be added to the feed at the rate of 0.5-1.5% see Table 1). Ammonium sulfate can be substituted for ammonium chloride. However, results may be less satisfactory.

Table 1. Ammonium Chloride as a Feed Additive (Preventative)

Ammonium Chloride	To mix, add lb/ton	For topdress, add g/lb feed
0.50%	10	2.27
1.00%	20	4.54
1.50%	30	6.81

6. The diet should provide ample amounts of Vitamin A.

7. Haphazard addition of "supplements" to balanced rations can result in a mineral imbalance in the total diet.

Treatment

1. *If urine flow is completely blocked*, consult a veterinarian. Surgical removal of the urethral process may provide beneficial if the blockage is at or near the end of the penis. However, in lambs and kids, the occlusion is frequently associated with the sigmoid flexure of the penis located inside the abdominal cavity.

2. *If obstruction of urine flow is not complete* (animal still passing small amounts of urine):

a. Smooth muscle relaxants in combination with anti-inflammatory agents may be helpful. Such treatment must be done under the supervision of a veterinarian, could prove to be expensive and is not practical on a large scale.

b. Withholding feed for 24 hours in conjunction with oral dosing of ammonium chloride (0.20-0.33 g/kg body weight) can acidify the urine and thereby dissolve struvite crystals associated with

high-grain rations (Table 2). Acidification of the urine should be maintained for ≥ 1 week due to the probable presence of multiple calculi in the bladder.

Table 2. Mixing Instructions for Ammonium Chloride Solutions (Oral Drench)

Ammonium Chloride Dose, g/kg BW	Animal Weight lb	Volume of Dose, cc			
			20	40	60
			mix _lb NH_4CL/gal. H_2O		
0.20	30	1.20	0.60	0.40	
	45	1.80	0.90	0.60	
	60	2.40	1.20	0.80	
0.26	30	1.56	0.78	0.52	
	45	2.34	1.17	0.78	
	60	3.12	1.56	1.04	
0.33	30	1.98	0.99	0.66	
	45	2.97	1.49	0.99	
	60	3.96	1.98	1.32	

Might experience difficulty in dissolving this amount of ammonium chloride per gal. of water. Will depend on salinity of water being used (shaded cells).

Doses were selected assuming a 20 cc drench gun would be used to administer the ammonium chloride solution.

***Caution*: Ammonia toxicity could be a potential problem if the higher doses of NH_4Cl are chosen. However, treatment of urinary calculi is a desperation effort. Therefore, the risk of ammonia complications may be tolerable in light of impending death if urine flow is not re-established.**