

Obstructive urolithiasis in a flock of male weaner sheep at an organised farm in semiarid Rajasthan

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ABSTRACT

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Obstructive urolithiasis (OU) may occur at any site but is most common at the penile sigmoid flexure in wethers and rams. Generally, single calculus causes obstruction in cattle where as, multiple calculi are common in sheep. At Central Sheep and Wool Research Institute (CSWRI), Avikanagar farm heavy incidence of urolithiasis was recorded during the months of May – July, 2004 and material from this incidence is the source material for this study. Overall incidence of urolithiasis among all the breeds was 10.35%. Breedwise, higher incidence was recorded in Garole (30.43%) followed by Bharat merino (25%), Garole X Malpura (6.77) and negligible in Malpura weaner males (0.88%). Necropsy examination revealed obstruction due to phosphatic calculi of non infectious origin located in urinary bladder, penile sigmoid flexure and kidneys. Predominant pathological lesions observed in urinary bladder, kidneys, penile urethra with, toxemia / uroperitonitis and edema. It is concluded that during summer months lack of fiber intake and increased dependence on concentrate feed would have played a role in predisposition of obstructive urolithiasis exclusively involving such a large number of male hoggets for the first time in the history of the institute.

Keywords: Obstructive urolithiasis, Rajasthan, sheep

Urolithiasis occurs in all ruminant species but is of importance in feeder steers and wethers^{3,5} maintained on heavy concentrate ration or on range pasture plants containing large quantities of oxalate, estrogen and silica that results in obstructive urolithiasis in 40-50% of animals¹⁰ (Radostits *et al.*, 2000). Similarly, a diet deficient in vitamin-A and calcium excretion in sheep fed with grains leads to marked increase in urine concentration. These short term changes in urine composition act as triggering and/or interactive factor in the development of uroliths⁸. In arid and semiarid environment water deprivation is also responsible for increased concentration of urine which is further exacerbated by heavy fluid loss due to sweating or lack of water availability to body. The concentration of individual solute in urine is having important role in causation of uroliths^{5,7,10}. Infection of the urinary tract by certain pathogen like *Streptococci*, *E.coli* and *Micrococci* may not only form the nidus but the reaction of the medium may be suitable to alter for the deposition of salts¹¹. The present report describes the incidence of obstructive urolithiasis

in male weaner of Bharat merino, garole and garole crosses at an organized farm.

MATERIALS AND METHODS

Farm history: Central Sheep and Wool Research Institute (CSWRI), Avikanagar is located in a semiarid part of Rajasthan, at a Latitude 75° 28' N, Longitude 26° 17'. The maximum temperature during summer (April- July) ranges from 38° C to 45 °C and minimum temperature during winter (November-February) ranges from 2 °C to 10° C. Average rainfall is about 400 mm and occurs mostly in July- August. There are occasional light showers in summer and winter. CSWRI is a well organized farm and standard animal husbandry practices are followed. About 3000 sheep of different breeds and breed crosses are maintained in separate units. All the animals are allowed nearly eight hours of effective grazing in natural and reseeded Cenchrus pastures during the day and kept in partially covered corrals during night. Grazing is supplemented with balanced concentrate feed (approx. 150g/day/animal for garole and 300g/day/animal for rest of the breeds) containing mineral mixtures through out the year. Water is

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provided thrice a day with addition of limestone as sanitiser and calcium supplement as well.

Occurrence: The incidence of urolithiasis in male weaner of Bharat Merino (BM), Garole (G), Garole crosses (GM) and Malpura (M) was recorded during May – July 2004. The age of the affected animals ranged between 3 to 6 months. The flock size of weaners during these months was BM (M-56, F-80), G (M-23, F-19), GM (M-59, F-46) and M (M-113, F-107). Detailed recording of clinical symptoms and postmortem examination of 26 carcasses (BM-14, Garole7-, GM-4, M-1) were carried out to ascertain the cause of death and sampling was done for laboratory confirmation. The representative tissues from liver, kidneys, lungs, spleen, heart, urinary bladder and urethra were processed for routine histopathological techniques and stained by H&E method. Sixteen urine samples collected from affected cases as well as during postmortem examination were subjected for pH and microscopic examination¹ and eight representative urine samples were also subjected to bacteriological examination. In order to control the disease, affected flock was treated with ammonium chloride 5-6 g/head/day for 7 days alongwith sodium chloride 2 % in feed. Roughage diet was increased and addition of limestone in drinking water was also discontinued.

RESULTS AND DISCUSSION

Mortality in weaner male flock of Bharat Merino started in the first week of May. Overall and breedwise incidence of urolithiasis in weaner males during May-July 2004 is presented in the following table-

Breed	Bharat merino (BM)	Garole (G)	Garole X Malpura (GM)	Malpura (M)	Overall incidence
Flock size	56	23	59	113	251
Deaths due to urolithiasis	14	7	4	1	26
% Mortality	25	30.43	6.77	0.88	10.35

Higher incidence of urolithiasis was recorded in Garole (30.43%) followed by Bharat merino

(25%), Garole X Malpura (6.77) and negligible in Malpura weaner males (0.88%). Overall incidence of urolithiasis among all the breeds was 10.35%. Comparatively, narrow penile urethra in a short stretcher breed like Garole would have been the main reason of higher incidence in this breed or rearing of these animals in changed environment i.e. from swamp to semiarid may be the other reason of higher incidence.

The clinical signs revealed frequent urination with straining, reduction in urine volume, distended abdomen (water belly) with swelling of perineum in some cases, swelling of penile region, minerals deposition on preputial hairs, colic, reluctance to move, recumbency and death (Fig. 1&2).

At necropsy toxemia observed in most of the cases, subcutaneous oedema predominantly at abdominal and perineal region, hydrothorax, diffuse peritonitis, accumulation of serosanguinous fluid having typical odour of urea in abdominal cavity. Thickened wall of markedly distended urinary bladder with dark coloured urine was observed with severe haemorrhage with or without blood clots. Accumulation of white hard/soft calculi of a few mm to 0.5cm in diameter at the neck of bladder was noticed to be responsible for obstruction. Similar type of calculi were also recovered from sigmoid flexure of urethra where the wall of urethra was thickened and haemorrhagic. In a few cases the obstruction was found without calculi due to formation of plug of blood clots intermixed with fine uroliths like particles. Kidneys were pale, swollen, enlarged, cystic and with or without petechial haemorrhage. Cut surface of the kidneys revealed deposition of calculi of different size in the cavities of medulla and renal pelvis (Fig. 3). However, Weaner females of the same age group were not affected clinically nor showed gross lesions simulating to urolithiasis in carcasses (5 deaths) received for necropsy examination.

Microscopically, hyperplasia of transitional epithelium (Fig. 4), severe haemorrhage, and mononuclear cell infiltration with wide separation of smooth muscles was observed in urinary bladder. Lumen of penile urethra found occluded with a plug of red blood corpuscles and white blood corpuscles intermixed with fibrinous material. Desquamation of tubular epithelium,



Fig. 1: Animal showing distended abdomen and reluctance to move

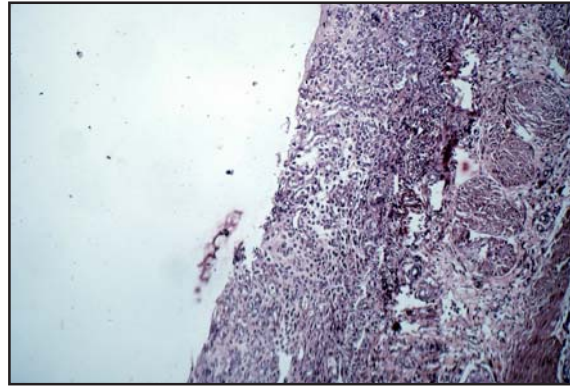


Fig. 4: Urinary bladder showing hyperplasia of transitional epithelium (H.E x 100)



Fig. 2: Swelling at penile region with minerals deposition on preputial hairs

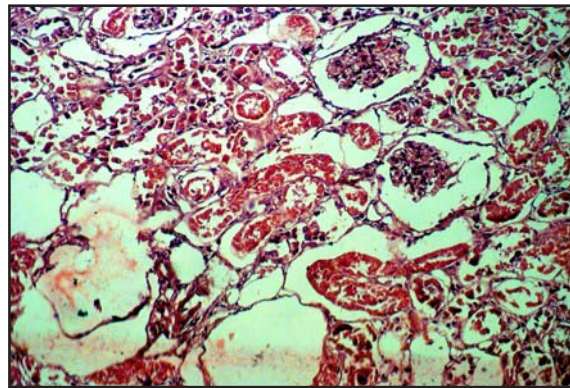


Fig. 5: Kidneys showing atrophy of glomeruli and edema (H.E x 200)



Fig. 3: Kidneys showing multiple calculi (arrows)



Fig. 6: Phosphatic crystals in urine

moderate to cystic dilatation of the tubular lumen, atrophy of the glomeruli and infiltration of oedematous fluid were the predominant lesions in kidneys (Fig. 5). No significant lesions were observed in liver, spleen, heart except degeneration in liver and oedema in lungs.

Findings recorded at clinical stage, necropsy and histopathological examination in various

organs reported in the present study related to obstructive urolithiasis were by and large similar to the observations of various workers^{2,4,6,9,10}.

Microscopic examination of urine revealed numerous colourless crystals suggestive of phosphatic (Fig. 6) in nature as described previously¹. The pH of urine ranged between 8-11, however, pathogenic organisms could not be

isolated on cultural examination. These observations led to conclude that the obstructive urolithiasis recorded in this study was non infectious in nature but due to phosphate containing calculi which use to occur commonly in alkaline pH of the urine. Radostits *et al.*¹⁰ opined that calcium and phosphorus imbalance in feed resulted in high urinary phosphate excretion which is an important factor in the genesis of phosphate calculi.

Adding ammonium chloride and sodium chloride in the feed with increased roughage diet and discontinuance of limestone addition in water controlled the urolithiasis instantaneously in all the affected flocks. These findings are in agreement with the observations recorded earlier^{6,10,12}.

In view of the over all observations through present study it could be concluded that the incidence of obstructive urolithiasis recorded in weaner males was non infectious and the various pathological lesions in different organs were due to the obstruction of phosphatic calculi in urinary bladder, penile sigmoid flexure and kidneys. Cumulative impact of dietary imbalance in the form of high concentrate with proportionately low roughage, probable disturbance of Ca : P ratio due to excess mineralization of water during hot humid environment and possibility of deficiency of Vit.-A would have been the contributory factors for predispositions by high alkaline pH and thus leading to obstructive urolithiasis in males. Control and preventive measures by addition of ammonium chloride and sodium chloride in the feed with balance diet and increase in roughage supplementation successfully controlled the situation.

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