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Visceral gout in the layers

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Gout was first described in India in 1941. It is found in broiler, layer as well as parent breeding stock. Layer are the poultry birds which are kept solely for the purpose of the egg production. Normally bird start laying egg at the age of 5 months after passing through the stage of grower/ Pullet. Visceral gout or Avian urolithiasis is a metabolic disorder of the poultry birds. The lesions in a bird can be the result of pleothera of causes. Unlike mammals which are ureotelic i.e. the end product of the nitrogen metabolism is the urea; birds don't have that luxury, instead they secrete uric acid due to the deficiency of the uricase enzyme. White chalk like deposit over the surface of the various visceral organ help to clearly identify the condition. These crystals are monosodium urate crystals (mostly) and calcium urate (very few). Visceral gout is the acute form of the disease while chronic form has needle shaped crystals (tophi) in the joint called as articular gout, this chronic form is found in very less percentage. Gout initially decreases the FCR (Feed conversion ratio), egg count of the flock and then shifts to mortality.

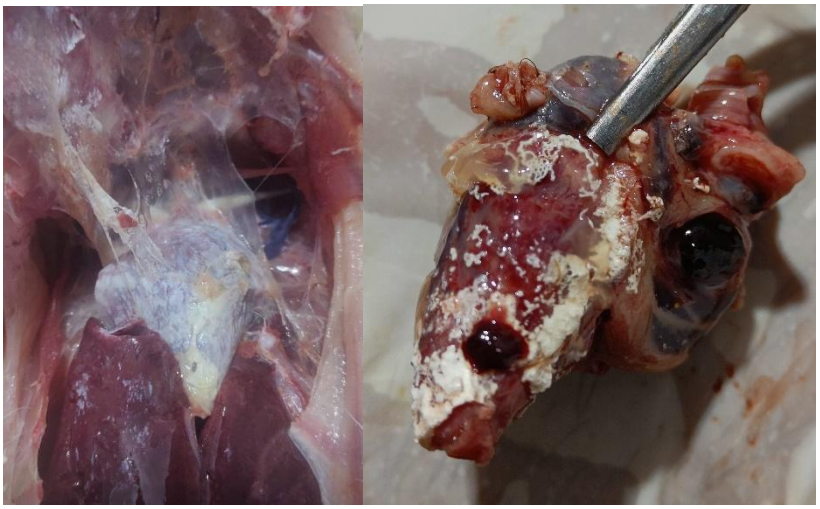

Fig. Presence of white chalky urate crystals on heart in case of visceral gout.

Causes

Visceral gout or gout in general is due to defect of the kidney to efficiently excrete the uric acid. The buildup can be due to a single entity or due to combination of various factors.

1. In scorching heat of summer season, water deprivation is the major cause for the buildup the serum uric acid level from the normal value of 5-7mg% to the upper range of >40mg%.
2. Low dietary phosphorus can also result in crystal deposit. Body needs acidic pH for excretion of the uric acid; phosphorus deficiency leads to alkaline pH.
3. Sodium bicarbonate is used to counter the heat stress and improve egg shell quality makes the urine alkaline causing nephrocalcinosis.
4. Vitamin A deficiency causes the sloughing of the metaplastic renal tubal epithelium resulting in the blockage of the ureter and/or kidney or both.
5. Protein rich diet >30% C.P. causes excess overload on the kidney.
6. Nephrotoxic chemicals like ochratoxin, aflatoxin (secondary nephrotoxic) causes damage to the kidney.
7. Copper sulphate dissolved in water, used against Aspergillosis can cause water refusal and further dehydration.
8. Gentamycin, nitrofuratoin, sulphonamide antibiotic alters the urine pH and cause renal damage.
9. Renal damaging pathogen like *Avian coronavirus* (renal form of Infectious bronchitis), *Avian nephritis virus* cause damage to nephron and intestitial space.
10. High salt content in diet put overload on nephrons when concentration exceeds 0.3%.

Lesions

Mortality is higher in young birds. In visceral gout serosal surface has white chalk like deposit over the surface of pericardium, liver, air sacs, mesentery, peritoneum, gizzard and intestines. Kidney is having enlarged lobules and ureter is distended with urates, cut section of kidney will reveal same chalky material in the parenchyma. Sharpness of these crystals causes physical damage. This damage attracts the inflammation. So, in histopathology deposits in tissue are surrounded peripherally with MNCs infiltrate. Renal tubule will be dilated and undergoing necrosis, with crystals or sloughed epithelium in the lumen. Deposits are seen at outer fibrous layer of pericardium.

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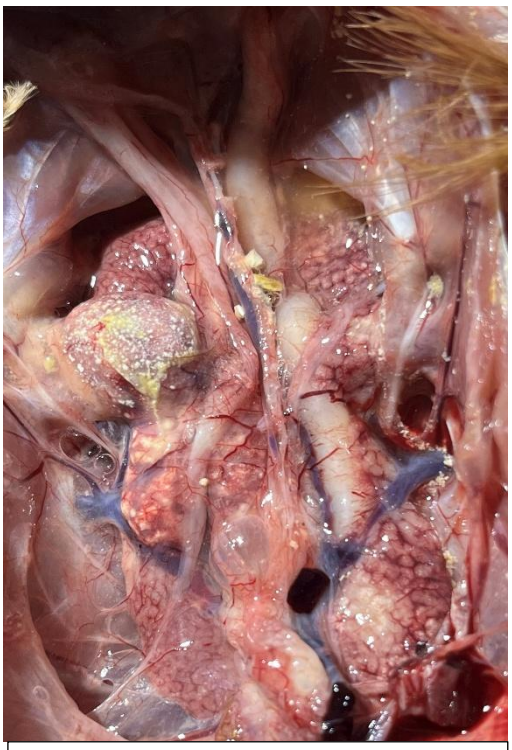

Fig. Urates deposit over the abdominal air sacs.

Fig. Over distended urates in visceral gout.

Tissue sample for histology is collected in either absolute alcohol. Special staining for demonstration of urate crystals is De Galantha's stain employing silver nitrate solution. Urate crystal imparts black colour and rest of background is of yellow colour.

Control and Prevention

1. Hydration will keep the birds well hydrated, check that from early life of chick. Provide adequate number of waterers to the bird.
2. Maintain correct balance of Ca:P in the diet.
3. Avoid feeding pullets more than 1% Ca in diet.
4. Use electrolytes to control mortality, jaggery is excellent substitute.
5. Avoid excessive protein in the diet.
6. When cases of visceral gout come in the farm, reduce the protein intake of layers, substitute maize with wheat or some other grain.
7. In case of vitamin-A deficiency supplementation is required in diet.
8. Sodium bicarbonate use shall be limited to the < 2g per kg feed.
9. Get the feed checked for the nephrotoxic mycotoxins like ochratoxin, citrinin, oosporein (avoid feeding mouldy grains/feed) and use toxic binders.

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