**Abnormalities of urine constituents**

 **protein uric.**

 proteinuria is observed in normal foals ,calves ,kids and lambs in the first 40 hours after they receive colostrum .

 Protein may be present in hemoglobinuria ,myoglobinuria ,and hematuria ,and when urinary tract infection are present. These causes for protein in urine should be excluded before making a diagnosis of renal diseases .

 The demonstration that proteinuria originates in the kidney is easier if elements that from in the kidney such as casts one also present in the urine .

 Proteinuria is often designated as albuminuria because of the high proportion of albumin present , it occur in :glomerulonephritis ,renal infarction ,tubular nephrosis and a myloidosis .

 Small amounts of protein may be present in the urine of animals suffering from fever and toxemia .

 Plasma protein enters urine when glomerular permeability is increased .

 Protein also can enters urine when tubular cells in acute tubular nephrosis.

 **Casts and cells**

Casts one organized ,tubular structures which vary in appearance depending on their composition .

 The occur only when the kidney is involved in the disease process.

 The one present as an indication of inflammatory of degenerative changes in the kidney where they from by agglomeration of desquamated cells and Tamm- Horse fall protein .

 Erythrocytes , leukocytes and epithelial cell in urine may originate in any part of the urinary tract.

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Hematuria:-

 Hematuria can result from pre renal causes when vascular occurs , such as trauma to the kidney ,septicemia and purpura hemorrhagica.

 Renal causes include:-

Acute glomerulonephritis ,renal infarction embolism of renal artery ,tubular damage as caused by toxic insult ,and pyelonephritis.

 Post renal hematuria occur particularly in urolithiasis and cystitis .

A special instance of hematuria is enzootic hematuria of cattle when hematuria originates from tumors of the urinary bladder .

 In horses ,there is a syndrome of ulceration of the proximal urethra that causes hematuria at the end a urination .

 In severe cause of hematuria blood may be voided as grossly visible clots but more commonly it causes a deep red to brown coloration of the urine.

 Less severe causes may show only cloudiness which settles to from a red deposit on standing .

Hemoglobinuria:-

 False Hemoglobinuria can occur in hematuria when erythrocytes are lysed and release their hemoglobin.

 True hemoglobinuria causes a deep red to brown coloration of urine and gives appositive reaction to biochemical tests for hemoglobin .

 There is no erythrocyte debris in sediment . There are many causes of intravascular hemolysis, the source of hemoglobinuria. The specific causes are listed under Hemolytic anemia. Normally, hemoglobin liberated from circulating erythrocytes is converted to bile pigments in the cells of the reticuloendothelial system. If hemolysis exceeds the capacity of this system to remove the hemoglobin, it accumulates in the blood until it exceeds a certain renal threshold and then passes into the urine .

Myoglobinuria:-

The presence of myoglobin (myohemoglobin) in the urine is evidence of sever muscle damage

The only notable occurrence in animals is azoturia of horses

 The myoglobin molecule is much smaller than hemoglobin and passes the glomerulus much more readily, so a detectable dark brown staining of the urine.

 As with hemoglobin ,myoglobin can contribute to uremia.

 Pyuria:-

 Leukocytes or pus in urine ,indicates inflammatory exudation at some point in the urinary tract ,usually the renal pelvis or bladder.

 Pyuria may occur as grossly visible clots or shreds, but often is detectable only by microscopic examination of urine sediment . Pyuria is usually accompanied by the presence of bacteria in urine.

Crystalluria:-

Crystalluria should not be overinterpreted in farm animals .

 Crystals in the urine of herbivorous animals have no special significance unless they occur in very large numbers and are associated with clinical signs of irritation of the urinary tract.

Calcium carbonate and triple phosphate crystals are commonly present in normal urine .

 If they occur in large numbers it may suggest that the urine is concentrated and indicate the possible future development of urolithiasis .

Glycosuria and Ketonuria:-

Glycosuria in combination with Ketonuria occur only in diabetes mellitus ,a rare disease in large animals .

 Glycosuria may occur in association with enterotoxaemia due to *Clostridium perfringens* type D and may occur after parenteral treatment with dextrose solution , adrenocorticotropic hormones or cortisone analogs .

 It occurs also in acute tubular nephrosis due to failure of tubular resorption.

 Ketonuria is a more common finding in ruminants .It occur in starvation ,acetonemia of cattle and pregnancy toxemia of ewes and does.

 Variation in daily urine flow

 An increase or decrease in urine flow is often described in animals .

 **Polyuria:**

 Polyuria occur when there is an increase in the volume of urine produced .

 Polyuria can result from extra renal causes as when horses habitually drink excessive quantities of water ,and less commonly , in central diabetes insipidus when there is inappropriate section or antidiuretic hormone (ADH) from the pituitary **central diabetes insipides** is mast common in horses suffering from pituitary tumors.

**Oliguria and anuria:**

 Reduction in the daily output (oliguria ) and complete absence of urine (anuria) occur under the same conditions and vary only in degree .

 In dehydrate animals ,urine flow naturally decreases in an effort to conserve water as plasma osmotic pressure increases .

 Congestive heart failure and peripheral circulatory failure may cause such a reduction in renal blood flow that oliguria follows.

 Complete anuria occurs most commonly in urethral obstruction ,although it may result from acute tubular nephrosis .

 Oliguria occur in the terminal stages of all forms of nephritis .

 Anuria and polyuria lead to retention of solutes and disturbances of acid-base balance that contribute to the pathogenesis of uremia .

 **Pollakiuria :-**

 This is an abnormally frequent passage of urine .

 It may occur with or without an increase in the volume of urine excreted and is commonly associated with the disease of lower urinary tract such as cystitis ,the presence of calculi in the bladder ,urethritis , and partial obstruction of the urethra .

 **Dribbling**:

 Is a steady ,intermittent passage of small volumes of urine , sometime precipitated by a change in pasture or increase in intra – abdominal pressure.

 Reflecting inadequate or lack of sphincter control .Dribbling occurs in large animals with incomplete obstructive urolithiasis and from persistent urachus .