

Uranalysis as a Means of Diagnosis in
Veterinary Diseases.

By

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Since uranalysis has come to be a very important factor in the diagnosis of human diseases, it seems reasonable that it might be of some aid in veterinary practice. While it may not be practical for the veterinarian to be so precise or accurate in his calculations as is the human physician, it seems reasonable that he make some use of the subject. For example, it is a comparatively easy matter in the human practice to collect all the urine excreted in twenty-four hours, while in veterinary practice this would be attended with more difficulty. This difficulty, however, may be remedied somewhat by taking the sample the first thing in the morning.

If the composition of the urine is an index of what is going on in the tissues it remains only for us to be able to recognize healthy and diseased conditions and to be able to make the tests fairly accurately. If one becomes familiar with uranalysis and its significance it can be made as valuable a means of diagnosing many diseases as any of the other methods at our disposal.

The following are some of the more important tests which are applied more especially to the horse.— specific gravity, reaction, quantity, color, consistency, odor, presence of sediment, sugar, albumen, urea and chlorides.

SPECIFIC GRAVITY: For all practical purposes the specific gravity may be taken with the urinometer. The fluid must be placed in a cylinder narrow enough to insure a proper depth for the instrument.

Normal urine varies from 1020 to 1060 in specific gravity but a persistantly high or low specific gravity denotes disease. In poly-urea the specific gravity runs about 1001 - 1005. In all high fevers the specific gravity runs high. There may be several reasons for this. First there is retention which allows for resorption of the fluid portion. Second there is a larger per cent of solids excreted.

Diuretics decrease specific gravity by increasing the fluid portion. This was demonstrated in one of the cases tested.

There is a relation generally between the total amount of urine and the specific gravity. The greater the amount the lower the specific gravity and vice versa. All these conditions should be carefully studied and noted in order that their significance may be found.

The quantity of urine may be roughly estimated without collecting the whole amount. This will be much easier if the animal be carefully watched. As a general rule when the quantity is large, the color will be light or turbid and when the amount is small the urine will have a high color. This high color is also found along with a high specific gravity. This is probably due to a resorption of the fluid portion or to a scanty secretion of the same.

CONSISTENCY: The urine may be thick and stringy or thick in any high fever due perhaps to retention and resorption, but it may have this property more especially in inflammation of the kidney, ureter or bladder.

In one of the cases tested, in which the urine was very thick,

There seemed to be some inflammation of the kidney but this was thought to be due to the retention of the urine. The animal was in considerable pain on account of enteritis.

ODOR: Equine urine has a characteristic odor which may be affected in diseased conditions.

Some drugs as camphor and turpentine affect the odor.

SEDIMENT: The urine may contain various sediments which may be due to various substances and conditions.

In any inflammation of the urinary tract there is apt to result epithelial cells and casts of the uriniferous tubules, in the discharge. To distinguish these the use of a microscope is required.

After a period of over work or exercise where fever results there may be found a sediment known as, brick dust sediment, and which dissolves upon heating. This sediment is said to be uric acid.

SUGAR: Sugar is an abnormal constituent of urine when it occurs in larger amount than 3%. Sugar is formed in the urine in cases of some respiratory diseases, in diabetes and in liver troubles. In the latter it generally signifies derangement of the glycogenic function of the liver.

Sugar may be detected in the following manner which method is taken from " Law Vol. III ".

"Add yeast to the urine and keep at from 15° - 20° C. If glucose is present the solution becomes cloudy and gives off CO₂".

Another method is to add KOH solution and a few drops of cupric sulphate solution until it is blue; Then heat and if sugar is present, the red precipitate of cuprous oxide is thrown down. The relative amount will give the per cent of glucose.

Holland gives the following: KOH and copper sulphate- Urine free from sugar does not dissolve copper sulphate and assumes a greenish yellow color on boiling. Urine containing sugar dissolves the hydrated cupric oxide formed with the development of a blue color, and precipitates on heating hydrated cuprous oxide, in yellowish red clouds.

UREA: Urea is found normally to the amount of 100-200 grammes in equine urine. Its proportion is increased by much work and by fevers. Fish says that urea is increased by dyspnoea, diabetes and phosphorous poisoning. An excess of urea always indicates waste of the tissues. The amount may be estimated in several ways, but the centrifuge method will be given.

Precipitate the phosphates in 10 cc by the addition of 1 grain of sodium carbonate and 1 -2 gm. ammonium hydroxide. The precipitate may be separated by rotating the machine at a high speed for several minutes, then decant.

To clear the solution add silver nitrate in 5% solution and 2 cc of ammonium hydroxide. Now only the precipitate of silver urate remains and it may be separated by rotation.

CHLORIDES: Chlorides are found normally in considerable amount. In acute respiratory diseases with fever they are said to be retained in the body. In convalescence they reappear even in excess, which is to be taken as a favorable symptom. Only one case of acute respiratory trouble was examined. In this the urine contained an excess of chlorides. It was late, however, in the course of the disease. The animal soon recovered.

ALBUMEN: Albumen is a pathologic constituent in urine. Its presence is caused by a variety of disorders. It is generally, though not invariably, considered as a serious symptom.

Law gives the following list of diseases in which albumen may be excreted in the urine, nephritis, pneumonia, epilepsy, anemia, leucaemia, diabetes, haematuria, infectious lung diseases and others.

The detection of albumen is quite simple. The sample in a test tube should first be rendered acid by the addition of a drop of acetic acid. It should then be heated to or near the boiling point when, if albumen is present, it will appear as a whitish cloud or coagulum.

Phosphates may be precipitated by heat but are dissolved by nitric acid. If, therefore, the white portion is dissolved by nitric acid it is proven to be phosphates. If, on the other hand, nitric acid will not dissolve the substance it is proven to be albumen.

The relative amount of albumen may be estimated by allowing the tube to stand for twenty four hours or by whirling it in a centrifuge which will facilitate the settling of the coagulum. After the albumen has

settled the amount may be estimated

MELANOTIC SARCOMA: When an animal is affected with melanotic sarcoma the condition may be proven from the urine. To a sample of the urine add a little chloride of iron when if melanin is present the fluid will become a deep black color. One case of this kind was tested in the above way and the condition was found to exist thus confirming the test.

The animal was 12-13 years old. He showed considerable urinary disturbance and refused to pass either urine or feces. Upon examination renal calculus was diagnosed. The urine was very thick and stringy. It contained considerable mucous and albumen due to the cystitis present.

The object in the bladder proved to be a melanotic sarcoma.

To be absolutely accurate in any of these calculations it would be necessary to resort to chemical means. One would of necessity have to be supplied with chemical apparatus and when these are at hand it requires much time and patience to arrive at results.

In most of the tests the centrifuge may be used. This instrument, while it is not absolutely accurate, will give approximate results.

The centrifuge is an apparatus equipped with percentage tubes which can be rotated at a high speed. Thus the centrifugal force generally brings about the hasty separation of the precipitate sought from the fluid. After the deposit has been thrown down its amount can be read off on the percentage tube in which it is contained.

By the use of this apparatus fairly accurate results may be obtained while there need be but little loss of time or patience.

It is certain that if a proper study of the urine be made, the knowledge will be of great use in diagnosing many diseases.

This is true in the human, why not in the veterinary practice.