CLINICOPATHOLOGY OF COMMON ANIMAL DISEASES

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Livestock sector plays a crucial role in sustaining rural economy and livelihood, a sector in which poor contribute directly to the economic growth. Infectious diseases of livestock are a major threat to global animal health and welfare and their effective control is crucial for agronomic health. For effective control diagnosis of infectious diseases is very important and which needs a fair understanding of the pathology of the diseases. There are number of diseases affecting animals leading to heavy economic losses due to decreased production and mortality. This note provides a brief knowledge of some of the major diseases.

BRUCELLOSIS/ Bang's disease –

Brucellosis is a serious problem in many parts of the globe since its recognition in early 20th century in Malta Island. The principal manifestations of the disease include reproductive failure, such as abortion or birth of unthrifty new born in the female, and orchitis and epididymitis associated with frequent sterility in the male. It is transmissible to man.

Etiology- The six recognized *Brucella* species and their preferred natural hosts are *Brucella abortus* (cattle), *Brucella melitensis* (goats), *Brucella suis* (pigs), *Brucella ovis* (sheep), *Brucella canis* (dogs) and *Brucella neotomae* (desert wood rat).

Clinical manifestations- The disease is most serious in cows infected during pregnancy. The bacteria show a preference for the pregnant uterus, foetus and the lymph glands of the udder. Both the membranes and foetus respond to *Brucella* infection by increasing their production of erythritol, a simple carbohydrate, which increases the growth rate of the bacteria. This usually results in abortion at about 6 to 8 months of gestation. The organism may also produce toxins and allergens, cause vascular thrombosis, increase uterine motility, and disturb production of sex steroids and prostaglandins, contributing to abortion. In some cases the dead foetus is not aborted, but is retained in a mummified or macerated form. If a calf is born alive it is likely to be weak and to contract calf scours easily. Many die soon after delivery. Foetal membranes are

commonly retained because of uterine inertia, placentitis or both. Retained membranes must be handled with great care. Puerperal metritis may develop and cows may remain infertile for some time. The animal may not abort on the next conception, but she will continue to discharge the *Brucella*. Some calves are born infected but may not show any signs of the disease and represent "latent infection". In male Orchitis occurs.

Microscopic lesions- Infiltration of phagocytic cells, epithelioid cells and lymphocytes, broncho-pneumonia in foetus and In males, proliferation of fibrous tissue in testes.

Diagnosis- A smear from the necrotic surface of placental cotyledons, stained with 20% fuchsin, 3% acetic acid and 10% methylene blue, can assist the first tentative diagnosis of brucellosis. The brucellae stain red against a blue background.

The bacteria are rarely cultured.

Milk ring test (MRT), also called the Bang Ring Test, a drop of haematoxylin-stained antigen is added to 1 ml of milk. This is incubated at 37°C for half to 1 hour. This test is widely used, fairly efficient, economical and easy to perform. A positive result is shown by the development of a clump of stained organisms deposited in a ring on the surface of the preparation. The negative result is bluish milk covered by an uncoloured layer of cream.

Rose Bengal Test (RBT) or rapid plate agglutination test. RBT is performed on serum using stained antigen at pH 3.6. It is economical, simple to perform and gives results in 4 minutes. Like the MRT, it is used as a quick screening test. A positive result is indicated by clear agglutination.

More sensitive and specific tests include the CFT. ELISA has been used to diagnose brucellosis, but has not been extensively adopted as a routine test.

BOVINE TUBERCULOSIS/ *Pearl disease*-

Is a chronic granulomatous disease characterized by presence of tubercular nodules on visceral organs. The disease is unfortunately more prevalent in exotic animals particularly in organized farms.

Etiology- *Mycobacterium bovis*

Symptoms- Progressive wasting/weakness, loss of production, fever and Coughing**.**

Macroscopic lesions- Tubercular nodules is present in lungs particularly, however, can also be found in spleen, lymph nodes, liver, intestines etc. Tubercles present on the pleura and mesentery gives characteristic pearly lesions.

Microscopic lesions- Tubercle consists of central caseative necrosed area surrounded by macrophages, lymphocytes, epithelioid cells and giant cells, characteristics of Granulomatous inflammation. There may be areas of calcification and fibrous tissue capsule in older cases.

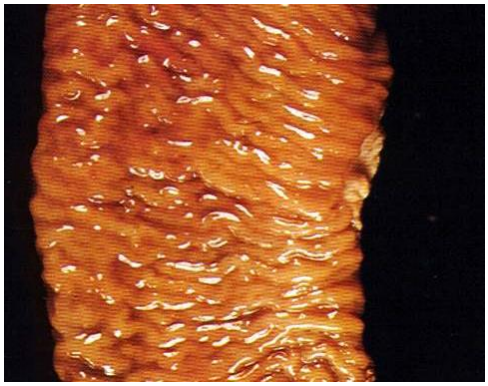
Diagnosis- Is done based on **s**ymptoms, lesions, Tuberculin testing of animals (SID & DID), microscopic examination of AFB in impression smears or in tissue sections.

JOHNE'S DISEASE / Paratuberculosis-

Is a chronic granulomatous disease of cattle, goat and sheep characterized by chronic wasting syndrome finally progressing to clinical disease, emaciation and death.

Etiology- *Mycobacterium avium* subspecies *paratuberculosis*, (MAP).

Symptoms- Cachexia**, c**hronic diarrhoea, and Progressive wasting/weakness.



Macroscopic lesions- Presence of '*rugae*' or transverse folds and enlarged mesenteric lymph nodes.

Microscopic lesions - AFB laden epithelioid cells, coalescing groups of epithelioid macrophages forming confluent sheets, small granulomas formed by macrophages, small numbers of lymphocytes, and multinucleated Langhan's giant cells in the intestine and lymph nodes, mesenteric lymph nodes are enlarged by 2 to 10 times the normal size, and showed moderate to marked expansion of both the cortex and the medulla. Caseous necrosis of Peyer's patches with ulceration of the overlying mucosa was present in the ileum of sheep and goat. However, caseative necrosis and calcification is absent in cattle.

Diagnosis- Can be done by Symptoms and lesions, Johnin testing (DID) of animals, microscopic finding of acid fast bacteria in rectal pinch or Bowel washings, Demonstration of organisms in tissue using special stains and immunoperoxidase technique and Immunological methods like- ELISA.

HAEMORRHAGIC SEPTICEMIA/ *Pasteurellosis*/ Stockyard disease-

Is a highly contagious and infectious disease of animals characterized by oedematous swelling in neck region, dyspnoea, pneumonia and wide spread haemorrhage in visceral organs.

Etiology- *Pasteurella multocida*

Symptoms-High fever (105-107°F), oedematous throat and brisket region, difficult breathing with ghar-ghar sound.

Macroscopic lesions –subcutaneous oedema in neck and brisket region, Serosanguinous fluid in peritoneal and pleural cavity, Swollen and enlarged lymph nodes, fibrinous pneumonia, gastroenteritis and Marbling of lungs**.**

Microscopic lesions- Petechial haemorhages are found in all serous and mucous membrane**,** Infiltration of neutrophils and macrophages. Fibrinous bronchopneumonia and swollen and congested lymph nodes, spleen, liver, kidneys and intestinal mucosa.

Diagnosis-Symptoms and lesions, bipolar bacteria in blood smears on methylene blue staining, Isolation and Immunodiagnostic tests.

LEPTOSPIROSIS/ Weil's disease-

Is an acute or chronic or clinically inapperent contagious disease of domesticated and wild animals as well as men characterized by fever , anaemia hemoglobinuria ,icterus & abortion.

Etiology: *Leptospira interrogans (L. pomona, L.grippotyphosa, L.hardjo, L.canicola,*

L.icterohemorrhagie)

Symptoms- High temperature, anorexia, petechiae on mucous membrane, hemoglobinuria and jaundice

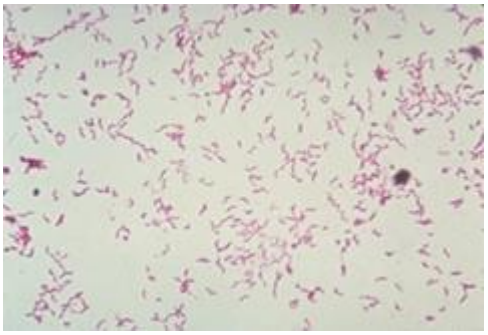
Lesions- Hemorrhage, Oedema, Necrosis and interstitial nephritis in kidneys, mastitis, pneumonia, Necrosis of liver, bile retention, Kupffer cells contains large amount of hemosiderin, enlarged lymph nodes.

Diagnosis : History, Clinical signs, elevation of leucocytic count, anemia, raised bilirubin value, Organism in blood or urine can be seen by dark field examination, serological diagnosis like Agglutination test, ELISA, FAT, demonstration of organism by Levaditi's stain.

CAMPYLOBACTERIOSIS/ Vibriosis-

Is an infectious disease of cattle and sheep characterized by early abortion and suppurative metritis**.**

Etiology- *Campylobacter foetus*.



Symptoms - Abortions at 5-6 month of gestation (*C. foetus*), 6-7 months (*C. jejuni*), ROP, Mucopurulent vaginal discharge.

Macroscopic lesions- the placenta becomes necrotic and separated. Endometritis, vaginitis and cervicitis. Oedematous foetus.

Microscopic lesions- small nodules and cystic glands of uterine mucosa reveals lymphocytic infiltration and oedema. Infiltration in cotyledons and placenta.

Diagnosis- based on symptoms, lesions, examination of smears from uterus and Isolation.

FOOT AND MOUTH DISEASE/ Aphthous fever-

FMD is one of the most feared viral diseases of cloven hoofed animals: most prevalent in cattle and buffaloes followed by sheep, goats and pigs. The disease is highly contagious, spreads very fast and listed under list A diseases of Office International des Epizooties. The disease has debilitating effects, including weight loss, decrease in milk production, loss of draught power, resulting in a loss of productivity for a considerable time.

FMDV belongs to genus *Apthovirus* of family *Picornavirideae*. These animals from which the FMDV is recovered at or beyond 28 days post-infection from oropharyngeal fluid (OPF) are called carrier animals and these may be responsible for outbreaks of the disease among in-contact susceptible animals.

Symptoms- High Fever, Vesicles in oral cavity leading to plenty of salivation, anorexia and on coronets leading to lameness.

Macroscopic lesions- Presence of ulcers and vesicles on tongue, lips, cheeks & palate, in young calves causes myocarditis which gives ***Tigroid*** lesions and enlarged spleen.

Microscopic lesions- Infiltration, Hydropic degeneration in middle layer of Stratum spinosum cells of

epidermis, Hyaline degeneration and necrosis of muscles of myocardium

Diagnosis – Is done based on symptoms and lesions, isolation, immunological tests like CFT, ELISA and electron microscopy.

PESTE DES PETITS IN RUMINANTS

PPR is an infectious viral disease of small ruminants characterized by giant cell pneumonia, erosive stomatitis and enteritis.

Etiology- Morbilli virus.

Symptoms- Fever (105-107°C), Diarrhoea, melena, Erosive mouth lesions, Skin eruptions. Mortality up to 80% .

Macroscopic lesions- Congestion and consolidation of lungs, Haemorrhagic/ erosive enteritis, Erosive mouth lesions, Erosive lesions in large intestine in strips along payers patches giving rise to ***"Zebra markings"*** in large intestine

Microscopic lesions- Pneumonia, Erosions and haemorrhages in oral mucous membrane and intestinal mucous membrane and Depletion of lymphoid cells in lymph nodes.

Diagnosis- Based on symptoms and lesions, AGPT, sandwitch ELISA, Isolation of virus and immunoperoxidase technique.

BLUETONGUE/ Catarrhal fever of sheep-

Is an infectious viral disease of sheep characterized by oedema and congestion of face, congestion and cyanosis of tongue, endothelial hyperplasia and arteritis.

Etiology- Orbivirus and transmitted by *Culicoides.*

Symptoms- Fever (105-107°F) for short duration, redness of nasal and oral mucosa with profuse salivation, oedematous swelling of lips, nose, ears, Cyanosis of tongue and ulceration in lips and tongue.

Macroscopic lesions- Oedema and congestion of face, head, neck, Oedema and cyanosis of tongue, Petechial haemorrhage on oral and nasal mucosa, Haemorrhage on coronets leading to pododermatitis, Haemorrhage in abomasum and intestines, necrosis and petechiae on skeletal muscles.

Microscopic lesions- Haemorrhage and infiltration of cells in tongue, abomasum and intestines, Hyperemia of vascular corium of skin in coronets and Haemorrhage in muscles of coronets.

Diagnosis- based on **s**ymptoms and lesions, AGPT, ELISA and Isolation of virus.

SWINE FEVER /Hog cholera-

It is an acute contagious viral disease of pigs and characterized by gluing of eyes, congestion and widespread haemorrhage in visceral organs.

Etiology- Pestivirus of Togaviridae family.

Symptoms- High **f**ever (105-106°F), loss of appetite, Huddling, cyanosis of skin with eruptions, vesicles on lips, vulva and ear edges. Mortality up to 100%

Macroscopic lesions- Congestion and haemorrhage in kidneys, lymph nodes, urinary bladder, skin, spleen, lungs and large intestines, *Button ulcers* in large intestines, *turkey egg* lesions of kidneys, swollen lymph glands and erythema and cyanosis on ventral abdomen and thorax skin.

Microscopic lesions- Non- purulent meningo-encephalitis**, p**erivascular cuffing in brain by lymphocytes, monocytes and plasma cells, Intranuclear, round, homogenous acidophilic inclusion in neurons, Haemorrhage in spleen, lymph nodes and kidneys, croupous pneumonia and necrosis of mucosa and submucosa in intestines leading to formation of ulcers and infiltration of mononuclear cells.

Diagnosis- Intense leucopenia and thrompocytopenia**, s**ymptoms and lesions, AGPT, FAT, immunoperoxidase technique and Isolation of virus.

RABIES/ Lyssa/Hydrophobia-

Is an acute, highly fatal, viral encephalomyelitis i.e. affects the brain and/or spinal cord, and found in the saliva of infected warm-blooded animals. Most often transmitted through the bite of a rabid animal (an animal with rabies). Vampire bats are important in the spread of the disease.

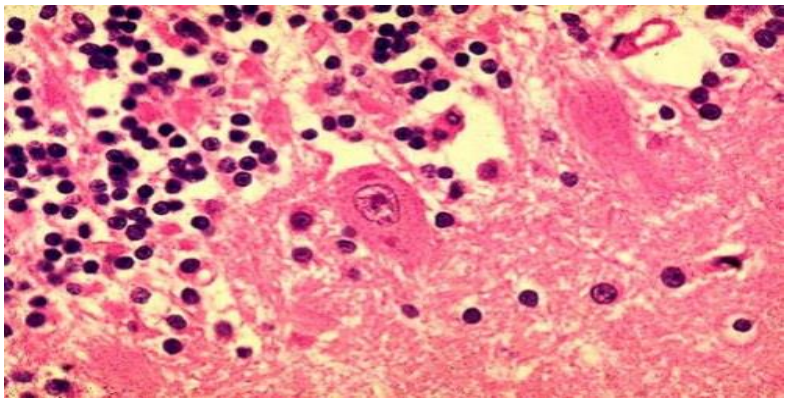
Etiology- Rhabdovirus.

Symptoms- Usually appear in one of two forms -the "dumb or paralytic form" & "furious form".
The "*dumb form*" is characterized by early paralysis of the throat & muscles of mastication , with profuse salivation & inability to swallow. In "*furious form*" the animal becomes irrational & viciously aggressive. This form is the classical "*mad dog syndrome*". Early symptoms are often similar to those seen with the flu and may include fever,, and general tiredness. In addition, the infected animal may experience discomfort, numbness, or pain at the site of the bite. Progressive symptoms of rabies can

include such things as insomnia, slight or partial paralysis, hallucinations, and hydrophobia (fear of water). In animal first sign is a change in behaviour.

Macroscopic Lesions- There are no gross lesions.

Microscopic lesions:- These are limited to CNS & extremely variable in extent . There is early necrosis of neurons with specific cytoplasmic inclusion bodies in the affective nerve cells. There is diffuse encephalitis characterized by perivascular cuffing & changes in shape of neurons . Changes are prominent in brain stem, hippocampus & the gasserian ganglion. Main lesions consist of collections of proliferating glial cells known as "Babes nodules". Negri bodies are not always present in rabies .These are intracytoplasmic. Negri bodies have a distinct limiting membrane encircle by clear by narrow halo.



Diagnosis- Symptoms, impression smears from the brain hippocampus, medulla oblongata, cerebellum and stain by seller's stain, FAT and a histological search of Negri bodies in tissue section. These inclusions may be completely within the cell body or may occur in dendrites.