NATIONAL DAIRY DEVELOPMENT BOARD ANAND GUJARAT

ANIMAL HEALTH UPDATES

Animal Health Group

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Disease - Contagious Bovine Pleuropneumonia (CBPP)

India is free from CBPP and has been declared so by Office International Des Epizooties (OIE) in May 2007. The purpose of providing details about this disease is to remain vigilant and report to authorities any suspected incidences.

Contagious bovine pleuropneumonia (CBPP) is a slow–spreading, infectious disease of cattle, primarily affecting the lungs and joints.

Marbling of lung is characteristic of the disease
Source :www.fao.org

Etiology

The disease is caused by *Mycoplasma mycoides* subsp. *mycoides*. The organism belongs to a cluster of six closely related species which affect cattle, sheep and goats. The agent of CBPP is not communicable to other species.

Epidemiology

Occurrence:

The disease has a world wide distribution. Other than India, only a few countries namely Australia, Botswana, Portugal, Switzerland and USA have been declared free by OIE in May 2007.

Outbreaks tend to be more extensive in housed animals and those in transit. In groups of susceptible cattle, the morbidity approaches 90% with a case mortality as high as 50%. Around 25% of the recovered cattle remain as carriers with or without clinical signs. Goats and sheep are not important in the epidemiology.

Source of infection

The focus of infection is often the recovered carrier animal in which a pulmonary sequestrum preserves a potential source of organisms for periods as long as 3 years. Renal lesions are not uncommon and large number of viable *M.mycoides* are passed in the urine of infected animals and therefore inhalation of urine droplets may also be a source of infection.

Methods of transmission

The principal method of spread is by inhalation of infective droplets from active or carrier cases.

Incubation period of CBPP may be as long as 6 months in cattle. Therefore, this necessitates a long period of quarantine before a herd can be declared free of the disease. Placenta and urine can also remain infective for long periods.

Risk and immune mechanisms

CBPP occurs only in cattle and rarely in buffaloes. There is no difference in the susceptibility of indigenous and exotic cattle and both respond equally to vaccination. A strong immunity develops after an attack of the natural disease in cattle. Vaccination plays an important role in control. The exact nature of immunity conferred by vaccination or natural infection is not clearly understood.

The organism is sensitive to all environmental influences, including disinfectants and does not survive in the environment for more than a few hours.

Pathogenesis

CBPP is an acute lobal pneumonia and pleurisy. An essential part of pathogenesis is thrombosis in the pulmonary vessels.

Clinical findings

The disease occurs in various forms of severity ranging from peracute, acute, sub-acute and chronic.

Peracute

In the peracute form the affected animal may die within a week of onset of respiratory distress. The peracute form of CBPP is uncommon. Cattle with this form of the disease develop many of the signs described for acute infection, or they may develop a severe form of pneumonia. Death usually comes 1 to 3 weeks after signs appear.

Acute

After an incubation of 3- 6 weeks (sometimes up to 6 months) there is a sudden onset of high fever, fall in milk yield, anorexia and cessation

Swollen knee joints in a calf with acute CBPP
Source: www.fao.org

of rumination. Coughing, at first only on exercise, and thoracic pain

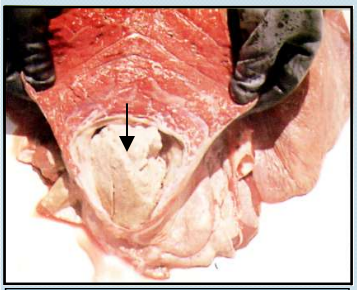
are evident. The animal assumes a characteristic stance, with head lowered, back arched, elbows pointed outward to allow the chest to maximally expand, and mouth open to ease its breathing. Swelling of throat, dewlap or large moveable joints may occur. In fatal cases, death occurs after a variable course from several days to 3 weeks.

Typical posture in CBPP
Source: www.cirad.fr

Subacute and chronic forms

Approximately 50% of the animals that become infected go through a mild sub clinical form of the disease. Although cattle do not show signs of disease, they become carriers and continue to spread CBPP. Normally, this form is not fatal for several years. Any time an animal with the mild form is under stress, it may develop signs of the acute form.

In some recovered animals an inactive sequestrum forms in the lung, with a necrotic centre of sufficient size to produce a toxaemia causing unthriftness, chronic cough and mild respiratory distress on exercise.



Pulmonary sequestrum in recovered cattle
Source :www.fao.org

These sequestra commonly breakdown when the animal is exposed to environmental stress and cause an acute attack of the disease.

Necropsy

Lesions are confined to thoracic cavity and are usually unilateral. The pleural cavity may contain large quantities of clear yellow brown fluid containing pieces of fibrin. This fluid is ideal for culture of the organism.

Consolidation of lung with a typically marbled appearance is characteristic.

In chronic or advanced cases, a sequestrum of necrotic lung varying from 1-10 cm in diameter is surrounded by fibrous capsule. If the sequestrae rupture and are drained by the bronchus, they can be source of aerosol infection to cattle.

Diagnosis

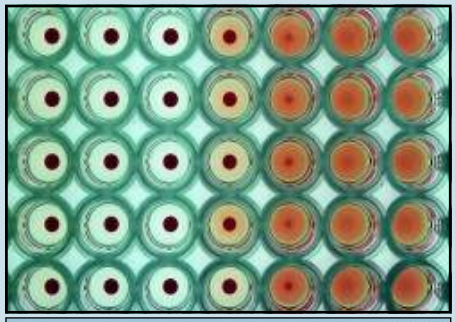
A. Serological tests

Serological tests for CBPP are valid at the herd level only.

1. Complement Fixation Test (CFT)

OIE has prescribed CFT for the purposes of international trade. Tests on single animals can be misleading, either because the animal is in the early stage of disease, before specific antibodies are produced, or it may be in the chronic stage of the disease when very few animals are seropositive.

For groups of animals, CFT is capable of detecting practically100% of infected groups.



CFT showing positives (left) and negatives (right)
Source : www.cirad.fr

The validity of the results has to be confirmed by post-mortem and bacteriological examination.

2. Competitive Enzyme Linked Immunosorbent Assay (C-ELISA)

This is another test prescribed by OIE for international trade. This is a herd test that is easier to perform than the CFT.

3. Immunoblotting(IB) test

This has also undergone evaluation and is reported to be highly specific and sensitive. It is to be used primarily as a confirmatory test. It is of particular value where disease control or eradication policies are being implemented.

B. Other tests

1. Tests for agent identification

The organism can be detected by (a) culture, (b) nucleic acid methods and (c) immunological tests.

The organism is fastidious in nature and special laboratory media is required for growth and identification.

The polymerase chain reaction (PCR) has also been used to detect small numbers of the organisms in nasal mucous, pleural fluid and pulmonary tissue.

2. Slide Agglutination Test (SAT)

A rapid field slide agglutination test (SAT) with either whole blood or serum has been developed to detect specific agglutinins. Due to a lack of sensitivity, the test detects only animals in the early stages (i.e acute phase of the disease). This test should be used only on a herd basis.

A latex agglutination test has also been developed that is easier to interpret than SAT.

To summarize, for control and eradication programmes, CF test and ELISA can be used for screening, but the highly specific IB test should be used as a confirmatory test. However IB test is not fit for mass screening.

Differential Diagnosis

Haemorrhagic Septicaemia, Theileriosis, Parasitic pneumonia, Tuberculosis, Ephemeral fever, Actinobacillosis, Reticulo- pericarditis, Rinderpest . However, India is free from Rinderpest.

Treatment

Mycoplasmas have no cell walls and are resistant to penicillin and related antimicrobials. Treatment may not eliminate the agent, especially in chronic cases with sequestrate. Epidemics of the disease may be exacerbated by the use of antimicrobials which reduce the effects of clinical disease while creating chronic carriers

In case of suspicion, the matter must be reported to the government Animal Husbandry Department. Do not collect samples for testing.

Vaccination

All the vaccines in use are living preparations and their use is always subject to the suspicion that they may spread the disease though such chances are remote.

The T1 strain broth vaccine is generally used and has an immunity of 2 years.

An intra nasal vaccine also gives satisfactory results but animals may develop a severe local lesion which is treated with mycoplasmocidal drug like tylosin. Since treatment interferes with development of immunity, such animals should be revaccinated.

Avianized vaccines have also been developed which gives immunity for 3-4 years. These vaccines are used the most nowadays.

Sources:
1.OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (2006).
2.PubMed
3.The Merck Veterinary Manual,8th Edition, Merck and Co., Inc. USA.
4.Veterinary Medicine,9th Edition , (Radostits et al 2000). A textbook of the diseases of cattle, sheep, pigs, goats and horses. W.B. Saunders Company Ltd.

OIE - Significant animal diseases reported to OIE in Feb – Mar'08

Sl.No	Disease Outbreak	Countries reporting
1	Foot and Mouth Disease	Lebanon, Israel, Zambia, Egypt, China
2	Bovine babesiosis	New Caledonia
3	Highly pathogenic Avian Influenza	Bulgaria, Hongkong, Laos, Vietnam, Turkey, Switzerland.
4	Blue Tongue	Italy
5	Rift Valley Fever	South Africa
6	African Swine Fever	Azerbaijan, Tanzania
7	Classical Swine Fever	El Salvador
8	Equine Rhinopneumonitis	Israel
9	Rabbit Haemorrhagic Fever	United States of America
10	Avian Infectious Bronchitis	Norway
11	Rabies	France
12	Contagious Equine Metritis	United Kingdom
13	New Castle Disease	Romania

Source: www.oie.int.

Prevalence of MRSA among vets: an international study.

A convenience sample of 272 participants at an international conference on pig health in Denmark was screened for Methicillin Resistant *Staphylococcus aureus* (MRSA) carriage using combined nose/throat swabs. They were asked to complete a questionnaire concerning animal contacts, exposure to known MRSA risk-factors, and the protective measures taken when entering pig farms. In total, 34 (12.5%) participants from nine countries carried MRSA. Protective measures, e.g., masks, gowns and gloves, did not protect against MRSA acquisition. Transmission of MRSA from pigs to staff tending to these animals appears to be an international problem, creating a new reservoir for community-acquired MRSA (CA-MRSA) in humans in Europe, and possibly worldwide. The rise of a new zoonotic source of MRSA could have a severe impact on the epidemiology of CA-MRSA, and may have consequences for the control of MRSA.

This article appeared in the January 2008 edition of *Clinical Microbiology and Infection* journal.

Source :www.ncbi.nlm.nih.gov

Solid Dose Injection being developed

Solid Dose Injector is a needle-free drug delivery system that enables the injection of drugs and vaccines. The product, which was voted overall winner at the 2007 Medical Futures Innovation Awards, combines a disposable drug cassette and a reusable applicator, capable of delivering a "rice sized" solid dose formulation of a particular drug directly through the skin using a spring-powered actuator.

Source : www.in-pharmatechnologist.com

A silicon tuning fork to provide an early detection of BSE and CJD.

The new technique, developed by researchers from Cornell University, is reportedly up to 1,000 times more sensitive than previous techniques for detection of prions in Bovine Spongiform Encephalopathy (BSE) and Creutzfeldt-Jacob disease (CJD). It is also quicker, more reliable, and does not rely on an autopsy sample.

The tuning fork consists of a sensor and resonator. The sensor consists of a 200nm thin film layer of low-stress silicon nitride covering a thermally oxidised silicon wafer. When excited by a 405nm diode laser beam, the two layers heat and expand at different rates, causing the resonator to vibrate very slightly.

The resonator is covered in prion-specific antibodies, which bind to the prions and fix them to the sensor. This causes a slight change in mass of the resonator, which in turn alters the resonant frequency, as objects with a greater mass tend to vibrate with a lower resonant frequency. By detecting this change in resonant frequency using a laser interferometer, scientists can determine the change in mass, which indicates quantity of prions attached to the sensor.

The prions by themselves are not heavy enough to cause a big difference in the resonant frequency of the resonator, so the scientists amplified the effect by adding heavier nanoparticles to the mixture that bind to the prions attached to the resonator. This produced a larger mass increase of the resonator for each prion detected, ultimately allowing the device to detect much lower levels of prions than had previously been possible.

The detection limit is 2 ng/mL, which is an improvement of two to three orders of magnitude over currently approved detection techniques.

It is hoped that the ability to detect very low levels of these pathogens in food sources will prepare quality control labs to take early action to prevent the spread of these deadly diseases. It could also be used in hospitals to provide an early diagnosis of the diseases in patients. These sensors could also be used to improve national security since they have potential to detect multiple biomolecules, it will be also be highly useful in counter terrorism efforts.

Source :www.in-pharmatechnologist.com

First report of *N.caninum* antibodies in cattle and buffaloes in India.

Neospora caninum is now recognized as a major cause of abortion in cattle worldwide, but there has been no report of *N.caninum* infection in cattle in India.

Serum samples from 427 dairy cattle and 32 dairy water buffaloes from 7 organized dairy farms located in Punjab, India, were tested for *N.caninum* antibodies using a commercial monoclonal antibody-based competitive enzyme-linked immunosorbent assay (ELISA).

Antibodies to *N.caninum* were found in 35 of 427 cattle (8.2%) from 6 of the 7 farms and also in 16 of 32 buffaloes (50%) tested from 2 dairy farms, suggesting postnatal transmission of *N.caninum* on the farm.

This is claimed to be probably the first report of *N.caninum* infection in cattle and buffaloes in India.

The report was published in the Dec'07 edition of *Journal of Parasitology*.

Source :www.ncbi.nlm.nih.gov

Transparent adult zebrafish to allow scientists to observe disease processes

Zebrafish are genetically similar to humans and are good models for human disease. The current ones are transparent only as embryos but turn opaque as adults therefore making observation of disease processes in vivo difficult.

A new zebrafish has been developed which could be a potential breakthrough in laboratory research since it is transparent even as adults.

This breed of fish can now be used to observe complex mechanisms such as tumour metastasis, all in real time. The fish's brain, heart, and digestive tract are also visible, allowing researchers to study genetic defects of these organs from early embryonic development through adulthood.

Scientists hope that this tool will provide insight into how mutated genes cause diseases ranging from Alzheimer's disease to inflammatory bowel disease.

Source : www.labtechnologist.com

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