

CONTAGIOUS CAPRINE PLEUROPNEUMONIA

AETIOLOGY

Classification of the causative agent

Family Mycoplasmataceae, *Mycoplasma capricolum* subsp. *capripneumoniae* (*Mccp*)

- Closely related to *M. capricolum* subsp. *capricolum* and more distantly related to other members of the “*Mycoplasma mycoides* cluster” such as *M. mycoides* subsp. *capri* or *M. leachii*.
- Unlike contagious caprine pleuropneumoniae (CCPP), which is confined to the thoracic cavity, the disease caused by other mycoplasmas of the mycoides cluster is accompanied by prominent lesions in other organs and/or parts of the body besides the thoracic cavity
- Formerly known as *Mycoplasma* sp. type F-38 (5)
- Genetic studies have grouped *Mccp* isolates into major clusters (2 or 3 depending on the study) that correlate with geographic regions. (4, 7)

Resistance to physical and chemical action (based on *M. mycoides mycoides* SC)

Temperature: Inactivated within 60 minutes at 56°C and within 2 minutes at 60°C, but can survive more than 10 years in frozen, infected pleural fluid.

pH: No information.

Chemicals: Inactivated by formaldehyde (0.05%/30 seconds) and a mercuric chloride (0.01%/1 minute)

Disinfectants: Many of the routinely used disinfectants will effectively inactivate the organism, e.g. phenol (1%/3 minutes).

Survival: Very fragile and not able to exist long in the external environment. On average only survives outside the host for up to 3 days in tropical areas and up to 2 weeks in temperate zones. Cultures can be inactivated by ultraviolet radiation within a few minutes.

EPIDEMIOLOGY

- CCPP is one of the most severe diseases of goats (9)
- Affects the respiratory tract, and is extremely contagious and frequently fatal
- In naive flocks, the morbidity rate may reach 100% and the mortality rate can be as high as 80%
- CCPP causes major economic losses in East Africa and the Middle East, where it is endemic
- During the only confirmed outbreak in wild ruminants, the morbidity rate was 100% in wild goats and 83% in Nubian ibex. The mortality rates in these two species were 82% and 58%, respectively

Hosts

- Goats are the primary hosts.
- Sheep may be affected In CCPP outbreaks affecting mixed goat and sheep herds. *Mccp* has also been isolated from healthy sheep, and their role as a possible reservoir must be considered.
- Recently CCPP was confirmed in wild ruminants kept in a wildlife preserve in Qatar. The disease affected wild goats (*Capra aegagrus*), Nubian Ibex (*Capra ibex nubiana*), Laristan mouflon (*Ovis orientalis laristanica*) and Gerenuk (*Litocranius walleri*) with significant morbidity and mortality in these species. (1)
- Disease indistinguishable from naturally occurring CCPP has been experimentally reproduced with *Mccp* by several groups of workers.

Transmission

- Contagious caprine pleuropneumoniae is contagious.
- Disease is transmitted during close contact by the inhalation of respiratory droplets.

- Chronic carriers may exist, but this remains unproven. Some outbreaks have occurred in endemic areas when apparently healthy goats were introduced into flocks.
- Outbreaks of the disease often occur after heavy rains (e.g. after the monsoons in India), after cold spells or after transportation over long distances. This may be because recovered carrier animals shed the infectious agent after the stress of sudden climatic or environmental changes.

Sources of agent

- Infectious aerosols.
- A carrier state is likely but not proven.

Occurrence

- Occurs in many countries in Africa and the Middle East. Exact distribution is not well known and could well include Asian countries.
- *Mycoplasma capricolum* subsp. *capripneumoniae* (*Mccp*), originally known as the F38 biotype, was first isolated in Kenya and subsequently isolated in the Sudan, Tunisia, Oman, Turkey, Chad, Uganda, Ethiopia, Niger, Tanzania, Eritrea and the United Arab Emirates
- First reported in mainland Europe in 2004, when outbreaks were confirmed in Thrace, Turkey, with losses of up to 25% in some herds (6)
- The exact distribution of *Mccp* is unknown as CCPP is often confused with other respiratory infections (Pasteurellosis) and isolation of the causative organism is difficult.

DIAGNOSIS

The incubation period under natural conditions is commonly six to 10 days, but may be prolonged (3–4 weeks). Some experimentally infected goats develop fever as soon as three days after inoculation and respiratory signs as early as five days, but others become ill up to 41 days after exposure.

CCPP should be suspected in the field when a highly contagious disease occurs in goats characterised by pyrexia of 41°C or greater, severe respiratory distress, high morbidity and mortality, and post-mortem lesions of fibrinous pleuropneumoniae with pronounced hepatisation and pleural adhesions.

Clinical diagnosis

Post-mortem examination reveals fibrinous pleuropneumoniae with massive lung hepatisation and pleurisy, accompanied by accumulation of straw-coloured pleural fluid.

- CCPP is strictly a respiratory disease. Peracute, acute and chronic forms occur in endemic areas.
- Peracute: affected goats may die within 1–3 days with minimal clinical signs.
- Acute: initial signs are high fever (41–43°C), lethargy and anorexia, followed within 2–3 days by coughing and laboured respiration. The cough is frequent, violent and productive. In the final stages of disease, the goat may not be able to move and stands with its front legs wide apart and its neck stiff and extended. Saliva can drip continuously from the mouth, and the animal may grunt or bleat in pain. Frothy nasal discharge and stringy saliva may be seen terminally. Pregnant goats can abort. Acutely affected goats generally die within seven to 10 days.
- Chronic: there is chronic cough, nasal discharge and debilitation.
- Peracute, acute and chronic disease, resembling the clinical signs in goats, were reported in captive wild goats, Nubian ibex, Laristan mouflon and gerenuk.

Lesions

- Lesions of CCPP are limited to the respiratory system.
- Acute disease is characterised by unilateral pneumonia and serofibrinous pleuritis with straw-coloured fluid in the thorax. On cut surface, the lung is granular with copious straw-coloured

exudates. Pea-sized, yellow nodules may be found in the lungs; these nodules are surrounded by areas of congestion. Varying degrees of lung consolidation or necrosis can be seen, and the regional (bronchial) lymph nodes are enlarged. Some long-term survivors have chronic pleuropneumoniae or chronic pleuritis, with encapsulation of acute lesions and numerous adhesions to the chest wall. The interlobular septa are not thickened in domesticated goats.

- Wild ruminants with CCPP have similar lesions; however, thickening of the interlobular septa has been reported in some animals.

Differential diagnosis

The diagnosis of outbreaks of respiratory disease in goats, and of CCPP in particular, is complicated, especially where it is endemic. *Mccp* is readily contagious and fatal to susceptible goats of all ages and both sexes, rarely affects sheep, and does not affect cattle.

- Peste des petits ruminants, to which sheep are also susceptible;
- Pasteurellosis, which can be differentiated on the basis of distribution of gross lung lesions;
- Contagious agalactia syndrome, also known as Mastitis, arthritis, keratitis, pneumonia and septicaemia syndrome (MAKEPS). As the latter name implies, the pneumonia is accompanied by prominent lesions in other organs, and is caused by other mycoplasmal organisms.

references and proposed modifications to the OIE Scientific and Technical Department (scientific.dept@oie.int). Last updated October 2009.