

Moraxella bovis

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General characteristics

- Moraxellae are short ,plump, Gram-negative rods.
- Characteristically in pairs.
- They are strict aerobic, oxidase-positive, catalase positive, non-motile .
- Their growth is enhanced by the addition of blood or serum .
- the optimal temperature for growth is 33-35C .
- *M.bovis* is unable to grow on MacConkey agar.

Natural Habitat

- The Moraxellae are commensals on the mucous membranes of animals and human .
- The reservoir of *M.bovis* is a conjunctiva or nasopharynx of asymptomatic cattle over 2 years of age.
- Transmission is by direct contact or via flying insect

Pathogenicity

- *M.bovis* the cause of infectious bovine keratoconjunctivitis, the most important ocular disease affecting cattle worldwide, also colloquially known as pink eye or New Forest eye.
- *M.bovis* was first associated with cattle pinkeye in 1915 in Bengal, India



349 Young steer with infectious keratoconjunctivitis showing the healing stage with the characteristic red cone of granulation tissue projecting from the cornea.

Pathogenicity

- Virulent *M.bovis* strains produce a haemolysin , pili and cytotoxin that **damages bovine neutrophils**
- Lipopolysaccharides, a collagenase and a hyaluronidase, produced by *M.bovis* ,may also **contribute to virulence**.

Pathogenicity

- Predisposing environmental factors are implicated in infectious bovine keratoconjunctivitis , these include irritation to the eyes by
- UV light(in sunlight)
- dust, long vegetation
- and flies

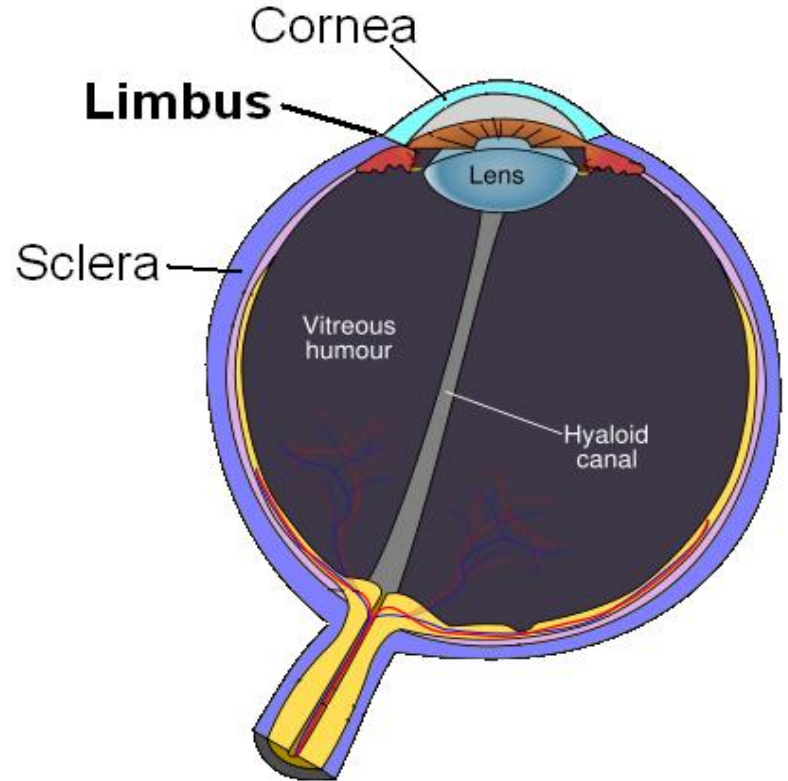
Pathogenicity

- Corneal opacity and oedema surround the ulcer and in severe case vascularization of the cornea occurs from the limbus to the ulcer .
- The corneal opacity then involve the entire cornea.



Pathogenicity

- In the healing stage ,granulation tissue forms on the ulcer floor and a characteristic red cone of granulation tissue will project from the cornea leaving a white corneal scar.



Pathogenicity

- The incidence of the disease is highest in the summer months
 - Young animals under 2 years of age are most commonly affected
- The early signs of infection in bovine keratoconjunctivitis are lacrimation ,blepharospasm and conjunctivitis.
- Later an ulcer develops on the cornea.

Laboratory diagnosis

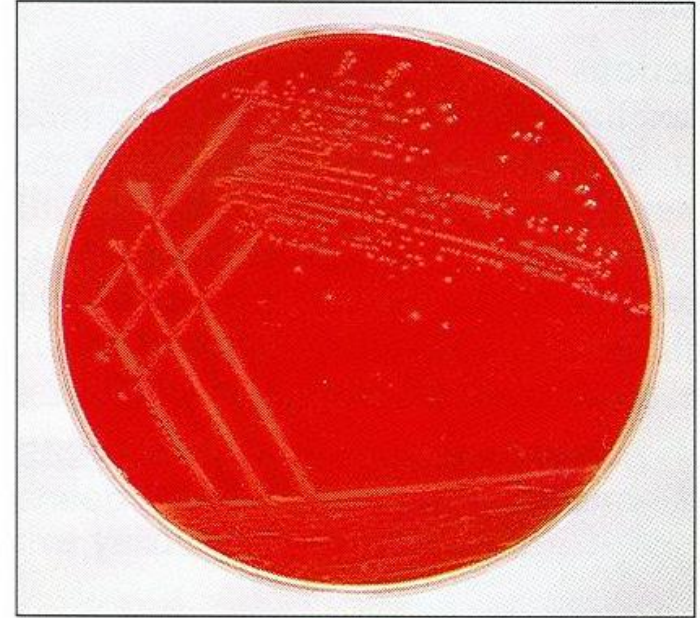
- **Specimens**
 - A swab of lacrimal secretion is taken from deep in the inner canthus of the eye.
 - The lacrimal secretion should be inoculated directly on blood agar

Direct microscopy

- Gram-stained smears are of little practical use ,but the fluorescent antibody technique on smear will demonstrate and identify *M.bovis* if sufficient bacterial cells are present.

Isolation

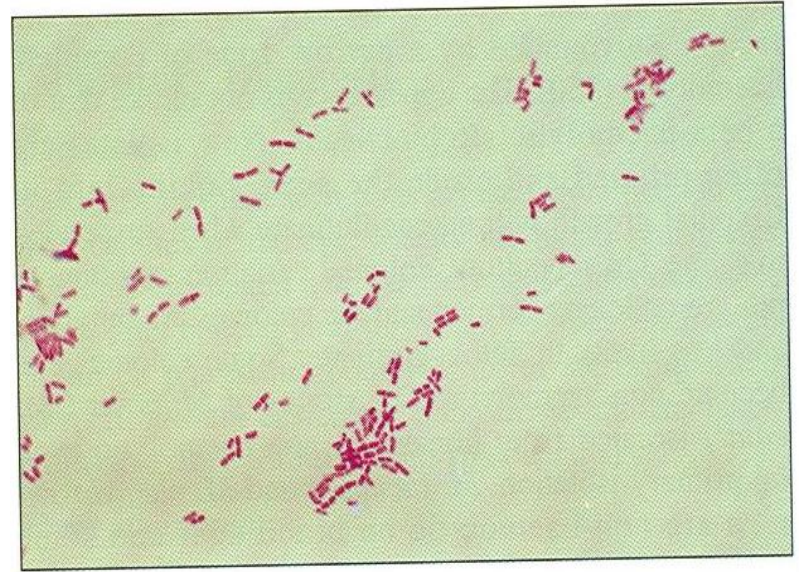
- Lacrimal secretions should be inoculated as soon as possible after collection on blood agar and incubated at 35C for 48-72 hours.
- After 48 hours of incubation the colonies of *M.bovis* are flat, round ,small(1 mm diameter), greyish-white and friable, surrounded by a narrow zone of complete hemolysis.



350 *Moraxella bovis* on sheep blood agar showing small haemolytic colonies. Some strains have larger zones of beta-haemolysis.

Microscopic appearance

- Gram stained smear from colonial growth reveal fat, Gram negative rods, or cocci ,characteristically in pairs .
- Specific identification of *M.bovis* can be obtained by a fluorescent antibody technique on smear from colonies.



351 *M. bovis* in a Gram-stained smear from a culture showing fat Gram-negative rods in pairs. Some strains occur as Gram-negative cocci in pairs. (Gram stain, $\times 1000$)

References and Textbooks

Quinn PJ, Cater ME, Markey BK, Carter GR". In:
clinical Veterinary Microbiology .2004; 2nd ed.