

## Popular Article

### Listeriosis in animals

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#### Introduction

*Listeria monocytogenes* causes listeriosis, also known as silage disease, circling disease, and meningoenkephalitis. It is an infectious and lethal disease that affects animals, birds, fish, crustaceans, and humans, causing septicaemia and enkephalitis. (Low & Donachie 1997; George 2002; Kahn 2005; Wesley 2007; Barbuddhe & Chakraborty 2009; Dhama, Verma, Rajagunalan, et al. 2013; OIE 2014).

The disease is characterized by the enkephalitis, abortion, septicaemia and mastitis in cattle, sheep, goat (Gray and Killinger, 1966). *Listeria* is a dangerous invasive zoonotic illness that causes septicaemia, abortion, stillbirth, meningitis, and menningioencephalitis in humans, with significant fatality rates (Varnam, 1991).

#### Etiology

Listeriosis is caused by members of the genus *Listeria*, which has now 17 species (Hage et al. 2014; Weller et al. 2015). However, only two species are considered pathogenic. *L. monocytogenes* is considered pathogenic to human beings and several animal species, whereas *L. ivanovii* is pathogenic especially to ruminants but occasionally to humans (McLauchlin & Martin 2008). *L. monocytogenes* is a Gram-positive, facultative intracellular and saprophytic bacterium that is ubiquitous, small, motile with flagella, nonspore forming, non-capsulated, pleomorphic, facultative anaerobic, rod-shaped coccobacillus capable of switching from an environmental saprophyte to a potentially fatal pathogen (Vazquez-Boland et al. 2001; Campero et al. 2002; Milillo et al. 2012; Mateus et al. 2013; Vera et al. 2013).

#### Host range

*Listeria* has wide host range, which includes 40 mammals, 20 birds, crustaceans, ticks and fishes (Sonnenworth, 1980). Among animals, ruminants are most commonly affected.

## **Epidemiology, transmission and spread**

It is categorized under List C of OIE; and the disease is worldwide in its distribution. The infection has been reported in countries over six continents and the public health significance of the pathogen lies in its ubiquitous nature. (Low and Donachie, 1997). *Listeria* spp. are widespread and truly ubiquitous in nature and commonly found in temperate zone. Rich sources include soil, manure/sewage, farm slurry, sludge, silage, animal feed, water and excreta/faeces of mammals and birds (Fenlon 1985). They are also isolated from walls, floors, drains, decaying vegetation, rivers, pasture herbage, factory effluents, etc. of farms and other environments (Fieseler et al. 2014). It may be present in poorly fermented silage (i.e. pH above 5.0–5.5) and in pockets of aerobic deterioration (Brugere-Picoux 2008). Dairy cows usually represent a reservoir for the bacterium; and raw milk as well as beef serves as a major source of transmission from dairy farms to humans (Ferreira et al. 2014). The infection by *L. monocytogenes* is generally transmitted through contaminated food (Farber and Peterkin, 1991). Generally, industrially processed foods such as raw meat, fish, milk, milk-related products has been linked for the listeriosis (Rocourt, 2000; Lyytikäinen et al., 2006; Kvistholm Jensen et al., 2010; Goulet et al., 2012; Dhama et al., 2013).

## **Zoonotic implications**

**Zoonotic implications** In humans, listeriosis may occur as a sporadic disease or as a food-borne outbreak to produce septicemic disease, meningo encephalitis, abortion and infection in other organs. Sporadic disease may involve healthy humans of any age but the disease usually occurs in the very young or unborn, the very old and people who are otherwise immunocompromised. The case fatality is high, and overall approximately 25% of reported cases die. The similarity of the disease spectrum in humans and animals and the occurrence of food-borne outbreaks has led to concerns that the disease could be a zoonosis.

## **Sign and Symptoms**

*Listeria* infection in animal shows broad range of symptoms from asymptomatic infection to uncommon cutaneous lesions or various focal infections such as conjunctivitis, urethritis, endocarditis, and severe disturbance of the gait, followed by death. The *L. monocytogenes* is a well-recognized cause of mastitis, abortion, repeat breeding, infertility, encephalitis, and septicemia in cattle (Barbuddhe et al., 2008; Deb et al. 2013).

## **Post Mortem Findings**

Post-mortem findings and histopathology in affected animals depend upon clinical presentation. Changes in cerebrospinal fluid are noticed in the encephalitic form with cloudy fluid and congestion of meningeal vessels. No gross pathological lesions of the brain have been observed

other than discolouration of the brain stem with softening and abscessation of the medulla noticed in some cases. Histopathology is pathognomonic of disease, consisting of micro-abscesses in the brainstem, spinal myelitis, perivascular lymphocytic cuffing, vasculitis, oedema and haemorrhages (Rocha, Lomonaco, et al. 2013). Most commonly, there is involvement of medulla and pons. Multiple foci of necrosis in the liver and spleen are seen less frequently in the septicaemic form.

## **Diagnosis**

Diagnosis is based on history, clinical signs, pathological lesions and detection of the pathogen. Previous exposure of disease, feeding habits, grazing pasture and observation of signs and symptom are helpful for presumptive diagnosis. Definitive diagnosis can be made only after isolation and identification of the bacterium (Kahn 2005). Isolation of *Listeria* is not much cumbersome as it can be readily isolated. Useful serodiagnostic tests are serum agglutination test, complement fixation test (CFT), haemagglutination (HA), haemagglutination inhibition (HI), antibody precipitation, growth inhibition test and enzyme linked immuosorbent assay (ELISA) (Capita et al. 2001; Dhama, Verma, Rajagunalan, et al. 2013; OIE 2014; Benetti et al. 2014)..

## **Treatment**

Treatment of listeriosis may be a difficult task because *L. monocytogenes* can invade virtually all cell types. Time period of treatment may vary according to the level of infection. In livestock and human beings, antibiotics have been used since long time for treatment of listeriosis. The intravenous injection of chlortetracycline (10 mg /kg BW per day for 5 days) is reasonably effective in meningoencephalitis of cattle but less so in sheep. Penicillin at a dosage of 44 000 IU/kg BW given intramuscularly daily for 7 days, and in many cases for 10-14 days, can also be used. Gentamicin has been found effective in treatment of bovine genital listeriosis (Chopra et al. 2012).

## **Control and vaccination**

Control is challenging due to the organism's widespread presence, the lack of a simple technique of recognising when it is present in significant quantities in the environment, and a lack of awareness of risk factors other than silage. Where silage is a danger concern, there may be some merit in the proposal that a diet change to include heavy feeding of silage be implemented gradually, especially if the silage is damaged or if listeriosis has previously occurred on the site. Tetracyclines can be fed to at-risk animals in a feedlot. When possible, clearly rotten silage should be segregated and not fed. Feeding devices that avoid eye contact with Silage should be used where uveitis is a problem.

A live attenuated vaccination has been demonstrated to elicit protection against intravenous challenge, and a live attenuated vaccine that has been used in Norway for several years has been proven to lower the annual incidence of the disease in sheep from 4% to 1.5 %. There is an economic model available to determine if vaccination should be used (Vagsholm et al.1991). Commercial killed vaccines are available for the control of the disease in some countries and some companies will also produce autogenous vaccines on request. The efficacy of vaccination still requires further determination; however, when economics or food availability on the farm dictate that contaminated Silage must be fed, consideration might be given to vaccination as a means of providing some protection.

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