

# **LISTERIOSIS**

*Listeria Monocytogenes*  
(A Psychrophilic Bacterium)

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# LISTERIA SPECIES

- There are currently many species are classified within the genera Listeria.
- But only Listeria monocytogenes and Listeria ivanovii are pathogenic to domestic animals.

# *Listeria monocytogenes*

- Gram positive, facultative, motile, rod
- LM is naturally found in:
  - Soil and vegetation (wet and dry)
    - Freshly harvested grass
    - Grass with higher moisture content
  - Fecal material (human and animal)
    - Isolated in healthy livestock (2-16%), wild animals, human sewage
  - Polluted water
  - Animal feed (silage and straw)

# Introduction

*Listeria monocytogenes* is a rod-shaped aerobic and gram positive pathogenic bacterium that invades the cytoplasm of living cells. It develops a distinctive rocket tail structure to help push through the cytoplasm. Eventually, these "rockets" push bacteria into neighboring cells, propagating the infection.

# Characteristics of LM

- Growth temperatures
- Acidity
- Water activity
- Air requirements

# Growth Temperatures

- Growth range = 30 to 113°F (-1 to 45°C)
  - Optimum = 86 to 98.6°F (30 to 37°C)
- Psychrotrophic (refrigeration temperature; <40F)
- Mesophilic (room to body temperature; 65-100F)
- Temperatures <32F moderately inactivate LM
- LM can survive freezing

# Acidity

- Typical pH range is 5.0 to 9.6
  - Optimum -neutral conditions ~6.0 - 7.0
- Growth at pH of  $<4.3$  has not been demonstrated
- LM can tolerate lower pH when kept at near refrigeration temperatures (vs. room & body temperatures)
- Most strains of LM are unlikely to grow in food products with pH  $< 5.2$

# Air requirements

- LM is a facultative organism
  - Can grow under aerobic (oxygenated conditions)
  - Can grow under reduced oxygenated conditions (semi-anaerobic)
  - Vacuum packaging provides a facultative environment → growth during long term refrigerated storage



# *Listeria monocytogenes*

- Effects on animals:
  - Generalized illness with abnormal behavior and posture (“Circling Disease”)
- Effects on humans:
  - Influenza-like symptoms with nausea, vomiting and diarrhea.
  - Systemic infection that may result in neurological signs and and abortions.

# *Epidemiology of Listeriosis*

- Ruminants, particularly **Sheep**.
- In ruminants it produces syndromes of encephalitis, spinal myelitis, abortion, septicemia, uveitis, and mastitis.
- Prime occurrence is seasonal associated with high listerial growth.
- Also following management induced stress.
- Commonly manifest with multiple cases in a group.

# Listeria in cattle

# Listeria in cattle

## Clinical finding

- Most commonly encephalitis with brainstem and cranial nerve dysfunction or abortion in last trimester of pregnancy.
- Less commonly septicemia in periparturient and neonatal sheep and goats.
- Enteritis in weaned sheep, spinalmyelitis, ophthalmitis, and occasionally mastitis.

# LISTERIAL ENCEPHALITIS

- Called as “CIRCLING DISEASE”.
- Separation from the herd and depression with a hunched stance.
- Fever 40 -42 °C.
- Incoordination, head deviation with head tilt, walking in circles, unilateral facial hypalgesia and facial paralysis.

# LISTERIAL ABORTION

- *Listeria ivanovii* and *L. monocytogenes*.
- Usually late term abortion or parturient death.
- Enlarged liver.
- Miliary creamy white liver lesions
- Usually sporadic abortions.
- Wet season or feeding on silage.

## Cont.....

- Full term foetus aborted due to listerial infection.
- Muconium staining of birth coat indicative of intrauterine foetal anoxia.
- Some indication of submandibular oedema indicative of parturient death.

## Cont....

- Miliary creamy white lesions 1-2 mm diameter in the liver.
- May also be seen in the lungs.
- Liver may be enlarged.
- Also seen in abortion associated with *Yersinia pseudotuberculosis*.



## Cont....

- Foetal membranes from foetus aborted due to listerial infection.
- Necrotic cotyledons.
- Thickened leathery chorioallantois, greyish in colour.

# DIAGNOSIS

- Culture and histopathology.

Samples:

- CNS listeriosis
  - (1) Bacteriology- half of midsagittally-sectioned brain, including brainstem, chilled or frozen
  - (2) Histology- Formalin fixed half of midsagittally-sectioned brain, including brainstem

Contd.....

Septicaemia and abortion

- (1) Bacteriology- liver, spleen, lung, placenta, fetal stomach content
- (2) Histology- formalin fixed liver, spleen, lung, brain, placenta, fetal intestine

## Culture Media:

- *Listeria* spp. required cold enrichment for their growth
- **Selective Media: PALCAM media**  
(Polymyxin acriflavine lithium chloride ceftazidime aesculin mannitol)



## **Culture Media:**

Grams staining:

- Gram positive rod shape bacteria

## **Molecular diagnosis**

- PCR and RTPCR can be used confirm the diagnosis of *Listeria* spp.

**Thank you**