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OVINE LISTERIOSIS

... a newly diagnosed cause of infectious abortion and lamb losses in Western Australia.

By S. M. DENNIS, B.V.Sc., Ph.D., Senior Veterinary Pathologist

LISTERIOSIS is an infectious disease occurring in animals and man and is caused by the bacterium \textit{Listeria monocytogenes}. It is worldwide in distribution and has been reported in 28 species of animals and 11 species of birds.

This disease was recently diagnosed in Western Australia for the first time when it was found to be a cause of abortion and perinatal lamb losses in sheep. This year listerial abortion has been diagnosed at Denbarker, Cranbrook, Katanning, Broomehill, Darkan, Northam and Clackline, and suspected in three other districts.

This organism is capable of infecting and causing disease in all species of domestic animals and most of the native fauna in the State. Sheep and cattle are the species most often attacked, followed by goats, pigs and fowls. In general, the clinical symptoms in sheep, cattle and goats show great resemblance and differ only in severity.

Ovine listeriosis may be separated into two distinct clinical entities neuro-listeriosis and genito-listeriosis. In other words the organism invades the central nervous system or genital tract and the developing lamb.

In older sheep the disease usually takes the first form, causing an encephalitis (inflammation of the brain), encephalomyelitis (inflammation of both the brain and spinal cord) or meningo-encephalitis (inflammation of the brain and surrounding membranes).

This course is not commonly observed in lambs. In lambs a septic condition usually prevails which is characterised by extensive damage to the liver, and focal pneumonia. The two distinct forms rarely occur together at the same time.

GENITO-LISTERIOSIS

Ovine genito-listeriosis causes abortion, premature births, stillbirths or fatal infections in the lamb during the first few weeks of life.

Studies have shown the pregnant ewe to be more susceptible to infection than the non-pregnant ewe. Clinically, the affected pregnant ewe rarely shows any signs of infection.

The sequence of events in a pregnant ewe appears to be as follows: \textit{Listeria monocytogenes} gains entry to the bloodstream and invades the uterus, causing inflammation (metritis) and necrotizing placentitis (inflammation of the afterbirth) with resultant septic invasion of the developing lamb. The lamb usually dies and is expelled as an abortion or premature birth, or retained and born dead at full-term. Sometimes lambs are born alive, but they may die soon after of septic listeriosis.

Lamb Losses

Listerial infection of the uterus may or may not result in infection of the lamb. If the ewe is infected towards the end of pregnancy the lamb may be infected at the time of lambing rather than via the placenta \textit{in utero} and may die from septic listeriosis or lepto-meningitis (inflammation of the membranes surrounding the brain) some 10 days later. The losses of lambs due to listeriosis are confined mainly to those prematurely dead or stillborn and that early post-natal deaths are not common.

Like the other infectious agents causing ovine abortion, listerial abortion usually occurs late in pregnancy. The aborting ewe, as a rule, cleans up rapidly and her subsequent reproduction is not affected.
The abortion rate is reported to vary from 1 per cent. to 25 per cent. It is noteworthy that neuro-listeriosis and listerial abortions rarely occur simultaneously.

Post Mortem
Post-mortem examination of the aborted or stillborn lambs often reveals a soft bronze-brown liver showing a number of scattered circumscribed whitish spots about the size of a pin head or slightly larger. These spots or lesions are small zones of degeneration in the liver due to septic listeriosis. A similar picture is seen in rodents.

NEURO-LISTERIOSIS
Neuro-listeriosis or "circling disease" is caused by invasion and infection of the brain by *Listeria monocytogenes*. This form of listerial infection has not yet been diagnosed in W.A. but in keeping with experience in other parts of the world cases may be recognised now that genital tract listeriosis has been disclosed.

Symptoms
The first indications of infection may be dullness, loss of appetite and a rise in temperature up to 106° F., followed in two to three days by signs of nervous disturbances. These first signs are often missed.

The infected animal wanders aimlessly, then tends to turn in circles with its head bent sideways, always in the same direction—hence the name "circling disease."

The infected sheep may stand with its head pushed against some solid object, or lean against objects such as fences or tree stumps. It is also inclined to tremble, gnash its teeth, may show torticollis (head twisted to one side) and may have a tendency to throw the head back. Strands of mucus may exude from the nostrils and mouth.

Eventually, the sheep falls and is unable to rise, becomes comatose and dies. Some sheep lie on their sides and their legs move as if trying to run. Convulsions may occur. The disease usually runs a rapid course with death often occurring within two or three days after the onset of clinical signs or occasionally may linger on for seven to 10 days.

Post Mortem
Post-mortem examination usually discloses no definite gross pathological changes in the viscera. Microscopic examination of the brain usually reveals infiltration of white blood cells around the blood vessels and in scattered focal areas. Culture of the uterus, vaginal discharge, placenta and lamb in genital tract infection, and brain and spinal fluid in nervous infections, usually results in the recovery of the causative bacterium.

TRANSMISSION

The exact mode of transmission of the disease under natural conditions is not clearly understood. The infection may apparently be spread by contact from animal to animal, by ingestion of contaminated feed and water, by infected particles of dust and dirt being trapped in the nostrils, pharynx and lungs, whilst venereal spread may possibly occur.

The disease may spread in a flock, but seldom are all the animals involved.

The infection may pass between different animals, for example from sheep to cattle and from sheep to pigs. The sudden occurrence of listeriosis with no apparent source of infection has often proved a puzzle.

There are apparently three possible reservoirs of infection of *Listeria monocytogenes*, namely:

1. **Native Fauna**: The danger to domestic animals will depend on the closeness of contact, but pasture contamination may occur. Rodents are suspected of harbouring latent infections and of being carriers.

2. **Carriers**: A number of outbreaks have been attributed to symptomless carriers in sheep. In such cases, the disease has occurred, apparently cleared up, and then broken out again after a period of time. Many outbreaks of listeriosis have occurred after the purchase of clinically healthy sheep from *Listeria* infected properties.

3. **Soil Contamination**: *Listeria monocytogenes* has been shown to be able to survive in contaminated soil and faeces.
for at least three months. This points to the importance of the massive contamination of pastures due to presence of millions of *Listeria* in uterine fluids, vaginal discharges, placentae and lambs and to a lesser degree, in faeces and urine. The organism shows considerable resistance to desiccation. Cases of infection have been recorded in animals which have been put on pastures previously grazed by infected animals. Blood-sucking arthropods such as ticks have been shown to be potential transmitters.

**SUSCEPTIBILITY**

Susceptibility to listeriosis is considered to be influenced by the following factors:

- **Age:** In general, young animals are known to be more susceptible to listeriosis than older animals.
- **Pregnancy:** The uterine contents of pregnant ewes are highly susceptible and appear to be the primary site of infection.
- **Climate:** Bad weather has been suggested as a contributory factor. The disease is more likely to occur under cold wet conditions.
- **Nutrition:** Lowering of resistance due to sudden change in feeding or malnutrition.
- **Transport:** A number of cases have been recognised after transportation of sheep over long distances.
- **Portal of Entry:** Varies depending upon the type of animal affected and type of listeriosis seen.

**TREATMENT**

Little success has been reported from the treatment of listeriosis in sheep under flock conditions. Individual valuable sheep may respond to terramycin and penicillin therapy if given in the early stages of the disease.

Vaccination, to date, has been ineffective.

**CONTROL**

As the epizootiology of listeriosis remains largely unknown there are no specific control measures. However, effective control appears to be accomplished by a programme of strict hygiene.

- Breeding flocks should be kept under close surveillance.
- All lambs dead for any reason (aborted, premature or stillborn), and afterbirth, should be burnt or buried or dropped into a 44-gallon drum containing disinfectant. This helps to reduce the soil contamination.
- Foxes, hawks and apparently crows may become infected and may possibly play a part in the transmission of infection to neighbouring flocks and properties. These predators must be prevented from eating the infected lambs and afterbirths (placentae.)
- All infected fluids and tissues should be kept away from the water and feed of the other pregnant ewes.
- Infected or suspected flocks should be run under set stocking conditions and isolated from the other flocks on the property. Temporary yards should be constructed for marking the lambs in these paddocks.
- Affected paddocks should be spelled for three months or more before re-stocking with other sheep or cattle in order to prevent recurrence of the disease.

Any farmer observing any of the signs suggestive of ovine listeriosis is advised to contact his nearest Government Veterinary Surgeon, Stock Inspector or private Veterinary Surgeon. Currently, in conjunction with the Vermin Branch, foxes, crows, rabbits, rats and mice are being caught and examined in an attempt to determine whether or not they are carriers of *Listeria*.

**WARNING**

Listeriosis is transmissible from animals to man. In most cases infection takes place by direct contact with diseased animals or their secretions or discharges. Strict hygiene should be observed in handling affected animals or animal tissues.
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