

Ovine Toxoplasmosis

- **What is toxoplasmosis?**

Toxoplasmosis is an important infectious disease of sheep and humans that may result in abortion, stillbirth or foetuses born with congenital infection. The disease is caused by *Toxoplasma gondii*, one of the most successful parasites worldwide, as it can infect all warm blooded animals. It is very small and invisible to the naked eye, consisting only of a single cell. *T. gondii* is the second most frequently diagnosed cause of ovine abortion in UK, only surpassed by *Chlamydophila abortus*.

- ***Toxoplasma* eggs (oocysts)**

T. gondii oocysts are produced by infected cats, the definitive host of the parasite. This stage of the parasite is very stable in the environment and may remain infective for 12-18 months depending on favourable temperate and moist climatic conditions. An infected cat will excrete millions of *Toxoplasma* eggs, which may persist in the environment and are a source of infection for all warm blooded animals. Experiments have shown that as few as 200 oocysts may cause disease in pregnant sheep. Most common disinfectants do not kill oocysts.



- **Infection via oocysts**

This is an example of horizontal transmission and happens when an animal or human ingests *Toxoplasma* oocysts. The parasite becomes activated in the gut, invades host cells where it multiplies and is transported around the body via the blood circulation to infect different organs. Under pressure from the immune system of the host, the parasite differentiates into slower replicating forms. These are contained within tissue cysts found throughout the whole body. The parasite can remain dormant within these tissue cysts for the lifetime of the host.

- **Transmission from mother to offspring**

This is called vertical transmission and happens when an infected mother transmits the parasite during pregnancy to the developing foetus.

- **How does the parasite cause disease?**

Infections occurring in non-pregnant animals generally show no clinical signs. However, if infection occurs for the first time during pregnancy then there is a substantial risk to the unborn foetus depending on the stage of gestation when infection occurs. The parasite infects the placenta and the maternal immune responses to this infection can result in inflammatory damage to the placenta, leading to foetal death. The risk for the foetus is greatest if infection occurs early in pregnancy. Infection later in gestation may result in birth of a live but persistently infected lamb.

- **Diagnosis**

Ovine toxoplasmosis is usually diagnosed by submitting aborted foetuses with their placentas to a veterinary investigation laboratory, where immuno-histochemistry tests will be used to detect parasites in the tissues. Blood samples from the foetus and the dam can also be tested for the presence of antibodies to *Toxoplasma*, which will confirm previous or ongoing infections.

● Control/management

Having closed flocks does not protect against *Toxoplasma* infection because of the widespread environmental contamination with oocysts. Farmers are advised to cover their feedbins to prevent access by cats. Following infection with the parasite, animals develop strong immunity which will protect against disease in subsequent pregnancies.

● Vaccine against toxoplasmosis

The most effective way to prevent ovine toxoplasmosis is to vaccinate sheep using a commercially available vaccine, which induces solid immunity to the parasite and works to prevent *T. gondii* associated abortion. This vaccine (Toxovax™) is a live vaccine, which is fully licensed in the UK and requires only a single injection. Replacement ewe lambs can be vaccinated from 5 months of age and non-pregnant ewes can be vaccinated at any time. It is not recommended to use this vaccine during pregnancy or during the 3 week period before tupping.

● Drug therapy

An anticoccidial drug, coccidiostat decoquinate (Deccox – Alparma Ltd) has been shown to reduce losses due to toxoplasmosis. The drug needs to be administered daily from mid-pregnancy onwards by addition to supplementary feeds.

● Transmission risks to humans

To help prevent transmission of *Toxoplasma* infections to people it is recommended that you wash hands after contact with infected materials, such as cat faeces, contaminated meat, infected ewes and lambs during lambing or handling the live vaccine. Consumption of undercooked meat containing *T. gondii* tissue cysts is also a risk factor. Fruit and vegetables should be washed thoroughly prior to eating to remove any *T. gondii* oocysts that may be present.

T. gondii parasites contained within a tissue cyst.

Image courtesy of Professor David Ferguson, University of Oxford.



● Disease in humans

In most cases people will only experience mild flu-like symptoms if they become infected by *Toxoplasma*, however if women get infected for the first time during pregnancy there may be serious consequences for the developing foetus. *Toxoplasma* parasites may also cause serious disease in those individuals with a compromised immune system either due to other infections or as a result of undergoing therapy for organ transplants or to treat cancer.

● Moredun Research Institute

We have a long standing history of working with farmers and vets to improve our understanding of how the infection is spread, how the parasite causes disease and how the immune system fights the parasite. Research at Moredun was instrumental in the development and efficacy testing of the *Toxoplasma* vaccine: Toxovax™.



Moredun

For further information please contact:

Dr Elisabeth Innes,
Moredun Research Institute, Pentlands Science Park, Bush Loan,
Penicuik, EH26 0PZ, Scotland, UK.

Tel: +44 (0)131 445 5111 Fax: +44 (0)131 445 6111
Email: lee.innes@moredun.ac.uk

www.moredun.ac.uk