V-1221

PUBLIC HEALTH FOCUS ON WATCH
AGRICULTURE

Toxoplasmosis

caused by the protozoan parasite *Toxoplasma gondii*

Neil W. Dyer
DVM, DACVP
Director, NDSU Diagnostic Laboratory

Charles L. Stoltenow
DVM, DACVPM
Extension Veterinarian

Toxoplasmosis is a disease of humans and animals caused by the protozoan parasite Toxoplasma gondii. The biology of T. gondii is complicated, but it is important to know that the life cycle of the parasite begins with felids (cats, both wild and domestic). ***Only felids*** *can shed the infective form (oocyst) of the parasite in their fecal material. Humans and other types of animals become infected when inadvertently ingesting this infective oocyst through contact with cat fecal material. In the case of humans this contact might be intiated by cleaning cat litter boxes, gardening where cats defecate or playing in a sandbox in which a cat has defecated.*

NDSU
Extension Service
North Dakota State University
Fargo, ND 58108

November 2001

The oocysts are very small and environmentally resistant, and can be ingested simply by touching contaminated hands to the mouth. Other species of animals, such as sheep, become infected by ingesting the oocyst when they graze where cats have defecated. Once the oocyst is inside the human or animal it can cause sudden disease or become quiescent (tissue cyst) for months to years. Humans can also become infected by consuming meat containing these tissue cysts.

Finally, cats reinfect themselves by consuming an animal which contains the tissue cysts, typically some type of rodent. Once the tissue cyst is back inside the cat it goes through a cycle which ultimately results in the release of the oocyst back into the environment.

Toxoplasmosis causes a variety of disease syndromes in humans, ranging from flu-like symptoms in immunocompetant adults, to severe disseminated disease in immunosuppressed individuals, to birth defects in infants when women are exposed during pregnancy. Knowledge of the parasite and its life cycle is important to individuals with potential exposure to the many species affected by this organism.

The disease in cats

- The protozoa reside in the intestine of members of the cat family.
- Cats become infected when they consume an animal (rodent, bird, etc.) which contains the tissue cyst.
  - Infection is more prevalent in stray cats acting as predators
- Cats passing *Toxoplasma* oocysts in their feces can infect other cats in the environment.
- Cats can die from a generalized *Toxoplasma* infection — particularly kittens or adults with a suppressed immune system.
- Infected cats typically shed *Toxoplasma* oocysts for one to two weeks and then develop immunity to the organism.
- Oocysts need to be in the environment (outside the cat) for one to three days before they are infective.
- Oocysts can remain infective in the environment for up to a year.
- Some cats remain carriers and will shed oocysts when **stressed**, such as during birthing or while concurrently on steroid therapy for other disease conditions.

EXPOSURE POINTS!

Prevention

Wear gloves or wash hands after cleaning cat litter boxes. Pregnant women should avoid contact with litter boxes.

Wear gloves when working in a garden, as cats may use gardens or landscaping areas for defecation.

Children's sandboxes are locations where cats may defecate. Use sandbox covers.

Testing

A serum test for *Toxoplasma* is available. Testing a cat will only deterimine if the animal **has been exposed to *Toxoplasma***, not if it is shedding the oocyst.

A fecal exam can be run to look for the oocyst. Results of this test are often negative since cats typically shed the oocyst for a short period of time (one to two weeks).

The disease in humans

- Humans can become infected by:
  - Ingesting the oocyst (contact with cat fecal material)
  - Ingesting the tissue cyst (eating contaminated or undercooked meat)

EXPOSURE POINT!

Thoroughly cook all meats before consumption. The tissue cyst can be consumed in undercooked meat and thereby transmit the infection to people. This is the most common method of *Toxoplasma* infection in humans. Recent studies have indicated that pigs can be asymptomatic carriers of *Toxoplasma*, therefore pork needs to be cooked completely.

- Other sources of human infection include:
  - Transplacental transmission (mother to offspring)
  - Organ transplantation (tissue cyst present in organ)
  - Blood transfusion (rare)
  - Milk transmission possible
- Majority of infections in humans are asymptomatic
- May see fever, malaise, swollen lymph nodes ("flu-like" symptoms)
- Congenital infections occur when a woman is exposed for the first time during pregnancy
  - Organism crosses the placental barrier in the absence of maternal antibodies
  - 10% of these cases result in abortion, stillbirth or central nervous system damage
- causes significant disease in immunosuppressed individuals
  - individuals receiving chemotherapy, immunosuppressive therapy during organ transplants, AIDS patients, elderly patients, patients with chronic disease
  - may see cerebral toxoplasmosis (AIDS patients), pneumonia, myocarditis (heart infection) and chorioretinitis (ocular infection)

The disease in sheep

- Ewes are asymptomatic
- Causes abortion in ewes and perinatal mortality in lambs
  - Causes characteristic inflammation of the placenta
  - Can test fetus for antibodies to *Toxoplasma*
- Depending on the stage of pregnancy at which the ewe is infected, the fetus may be aborted, retained, mummified, or stillborn
- If fetus survives the infection, it may be born alive but weak
- Ewes that abort due to *Toxoplasma* one year typically have a normal lamb the next (immunity develops)
- Vaccine available
- Sheep can develop tissue cysts by ingesting infective oocysts (grazing) where cats have defecated.

EXPOSURE POINT!

Humans can be exposed to *Toxoplasma* infected sheep when assisting with lambing, handling placental tissues from infected ewes or caring for infected lambs. Wear gloves and/or wash hands thoroughly when engaging in these husbandry practices.

Control measures

- Proper cleaning and handling of cat litter boxes
  - Wash hands
  - Wear protective gloves when appropriate
- Do not feed raw meat to cats as it may contain infective tissue cysts
- Cover children's sandboxes to deter cats from defecating in such locations
- Take precautions in lambing operations
- If undercooked meat is desired, it should be hard frozen prior to cooking
- The oocyst is destroyed by freezing (0°F, –14°C), heating (150 °F, 65°C), boiling water, iodine, and ammonia.

For more information on this and other topics, see: www.ag.ndsu.edu

2M-11-01