Pennsylvania Game Commission Wildlife Disease Reference Library

Sarcocystosis

<u>Other Names</u>: Sarcocystis, sarcosporidiosis, sarcocystoides, rice breast disease

Cause

Sarcocystosis is a disease of birds and mammals caused by several species of single-celled coccidian protozoa in the group called *Sarcocystis*. *Sarcocystis* relies on predator-prey relationships to maintain its life cycle. The protozoa form cysts within the muscle tissue of prey which act as intermediate hosts, and predators, the definitive hosts, become infected when they ingest prey containing these cysts.

Significance

Sarcocystis infection is common in many species of wild and domestic animals. Humans have become infected following ingestion of infected pork or beef. Though there is no evidence that the species of *Sarcocystis* that infect wildlife can cause disease in humans, hunters are advised not to consume obviously infected animals. Hunters are most likely to encounter this disease in rabbits and ducks.

Species Affected

Each species of *Sarcocystis* protozoa specifically infects their own species of intermediate (prey) and definitive hosts (predator). Many species of mammals can act as intermediate hosts for *Sarcocystis* including white-tailed deer, mule deer, moose, elk, caribou, rodents, rabbits, pigs, horses, cattle, sheep, and goats. Mammalian definitive hosts include foxes, coyotes, wolves, raccoons, opossums, domestic dogs, cats, and some primates (including humans). Some species of marsupials (such as opossums), primates, and carnivores can act as both intermediate and definitive hosts. Some birds that act as intermediate hosts include dabbling ducks, geese, pheasants, herons, egrets, and domestic chickens. Bird definitive hosts include predatory species such as hawks, owls, and kestrels. Some snake species are also known to act as definitive hosts for some species of *Sarcocystis*.

Distribution

Sarcocystis has a worldwide distribution. Including Pennsylvania, where it occurs sporadically in water fowl.

Transmission

Definitive hosts become infected by feeding on prey items whose tissues contain encysted *Sarcocystis* protozoa. The protozoa reproduce within the definitive host and produce eggs which develop into infective sporocysts (protozoa encased in a protective covering) that are released in the feces. Sporocysts can remain infective in the environment for months. Intermediate hosts become infected when they ingest sporocysts in food or water contaminated with feces from a definitive host. Within those intermediate hosts, the protozoa form cysts within muscle and other tissues that persist until consumed by a carnivore or omnivore.

Clinical Signs

The development of clinical signs often depends on the number of sporocysts ingested and the species of *Sarcocystis*. In general, most animals do not experience observable clinical signs as a result of *Sarcocystis* infection. Intermediate mammalian hosts may exhibit loss of appetite, lethargy, diarrhea, weight loss, weakness, or muscle twitching. Clinical signs may last several days to several weeks. When pregnant mammals ingest sporocysts they may abort or give birth to a stillborn fetus. Intermediate avian hosts usually do not show clinical signs, but when they do they may exhibit loss of appetite, weakness, difficulty breathing, neurologic signs, and may have blood in the mouth. Animals that ingest a large quantity of sporocysts may die. Definitive hosts typically do not show any clinical signs of sarcosystosis.

Cysts are often obvious when waterfowl and other birds acting as intermediate hosts are field dressed by hunters, or at necropsy. Tan to white cysts resembling parallel grains of rice may be observed throughout the breast muscle tissue and other muscles, including the heart. The affected tissue often feels gritty when cut with a knife. In mammalian intermediate hosts, cysts can vary greatly in shape and may be grossly visible or microscopic depending on the *Sarcocystis* species. Grossly visible cysts in mammals may look like tan-white grains of rice, or they may be long and threadlike, or even round. Some animals that die from sarcocystosis will have hemorrhage throughout the body.

Rice grain-like cysts within the breast muscle tissue of an American black duck; photo courtesy of USGS by James Runningen

Diagnosis

Sarcocystosis can be diagnosed by identifying the cysts within muscle tissue. In some affected animals the cysts will be grossly visible, while others will require microscopic examination of muscle tissue for

diagnosis. Other laboratory tests are also available to diagnose this disease. Infections in definitive hosts can be diagnosed by identifying sporocysts in the feces using fecal flotation methods.

Treatment

There is no treatment for sarcocystosis in wildlife.

Management/Prevention

There are currently no efforts to control sarcocystosis in free-ranging wildlife. Good sanitation is important to control this disease in domestic and captive animals. Freezing meat prior to cooking can also help to kill the organisms. Uncooked meat should not be eaten by humans or domestic carnivores. Severely affected carcasses are condemned as unfit for human consumption. Condemned carcasses should be buried or incinerated, and should not be left out to be eaten by wild scavengers.

Suggested Reading

Dubey, J. P., and K. Odening. 2001. Toxoplasmosis and Related Infections. Pages 478-519 *in* W. M. Samuel, M. J. Pybus, and A. A. Kocan, editors. Parasitic Diseases of Wild Mammals. Iowa State University Press, Ames, Iowa, USA.

Greiner, E. C. 2008. *Isospora, Atoxoplasma,* and *Sarcocystis*. Pages 108-119 *in* C. T. Atkinson, N. J. Thomas, and D. B. Hunter, editors. Parasitic Diseases of Wild Birds. Wiley-Blackwell, Ames, Iowa, USA.

Michigan Department of Natural Resources. Wildlife Disease. Sarcocystis. < http://www.michigan.gov/dnr/1,1607,7-153-10370_12150_12220-27272--,00.html>.

Tuggle, B. N., and M. Friend. Sarcocystis. Pages 219-222 *in* M. Friend, and J. C. Franson, technical editors. Field Manual of Wildlife Diseases: Birds. United States Geological Survey.