

## BASICS

Sarcocystosis, known as rice breast disease in waterfowl, is caused by single-celled protozoal parasites in the genus *Sarcocystis*.

*Sarcocystis* parasites infect numerous species of mammals, marsupials, birds, and reptiles, and infection is common in both wild and domestic animals.

Each *Sarcocystis* species uses specific definitive and intermediate hosts in their life cycles, although some species can infect several species of animals.

**DEFINITIVE HOSTS** include foxes, coyotes, wolves, wild felids, opossums, raccoons, raptors, snakes, and domestic cats and dogs.

**INTERMEDIATE HOSTS** include white-tailed deer, moose, rodents, rabbits, ducks, geese, and domestic livestock and poultry.

Humans can also be infected by some *Sarcocystis* species.

**CLINICAL SIGNS** are not usually seen in infected animals, but infection may cause muscle inflammation or encephalitis resulting in loss of appetite, weakness, respiratory difficulty, and neurologic signs. Infected waterfowl typically appear healthy.

**TRANSMISSION** occurs through ingestion of eggs and tissue cysts in the predator/prey cycle.

**DIAGNOSIS** in waterfowl can be made by seeing the cysts, which resemble grains of rice, in breast muscle. Cysts feel gritty when cut with a knife. Hunters may mistake the cysts for maggots when field dressing birds. For other *Sarcocystis* species, examination of tissues under a microscope is needed to identify cysts. In definitive hosts, diagnosis can be made by identifying eggs in feces.

There is **NO TREATMENT** for sarcocystosis in wildlife, and the disease does not threaten wildlife populations.



INGESTION



MAMMALS,  
BIRDS &  
REPTILES

## DETAILS

*Sarcocystis* parasites are found worldwide in a wide variety of animals.

The life cycle of *Sarcocystis* parasites relies on two hosts. Carnivores and omnivores act as definitive hosts with the adult sexual stage of the parasite residing and reproducing in the intestine. Infective sporocysts are deposited in the feces. Intermediate hosts, typically prey species, ingest infective sporocysts in contaminated food or water. The parasites develop and multiply asexually in the vascular system, eventually becoming encysted in muscle and other tissues. The life cycle is completed when these cysts are ingested by predators or scavengers.

In intermediate hosts, cysts typically occur in skeletal or heart muscles. Occasionally, cysts may be found in the central nervous system. Depending on the *Sarcocystis* species, tissue cysts range from microscopic to resembling a grain of rice.

*S. rileyi* commonly infects dabbling ducks, including mallards, pintails, shovelers, and black ducks, as intermediate hosts; definitive hosts include foxes, skunk, mink, and dogs.

The Virginia opossum is the definitive host for *S. neurona*, the cause of equine protozoal myeloencephalitis in horses. Other intermediate hosts of *S. neurona* include sea otters, seals, lynx, bobcat, mink, raccoons, skunks, and armadillos. The opossum is also the definitive host of *S. falcatula* which uses birds as intermediate hosts.

*S. odocoileocanis* is commonly found in white-tailed deer and uses wolves, coyotes, foxes, and dogs as definitive hosts.

Raptors, such as Cooper's hawks and red-tailed hawks, and corvids are definitive hosts for *S. calchasi*, the cause of pigeon protozoal encephalitis.

Humans act as the definitive host for *S. hominis* and *S. suihominis* with cattle and pigs, respectively, acting as intermediate hosts.

**CLINICAL SIGNS** are not usually seen in infected animals, although intermediate hosts may suffer serious effects, especially with high doses of parasites.

*S. neurona* caused a mortality event in sea otters with neurologic signs, including seizures, muscle tremors, partial paralysis, and coma.

Brandt's cormorants, infected with *S. calchasi*, were reported with signs of neurologic disease, including head tilt, neck twisting, tremors, paralysis, and incoordination.

*S. nesbitti*, which uses snakes as a definitive host, has been reported as causing outbreaks of sarcosystosis in humans, with clinical signs of fever, headaches, and muscle aches.

Depending on the species of *Sarcocystis*, tissue cysts in intermediate hosts may be visible or microscopic. Among waterfowl, visible cysts resembling grains of rice are commonly seen in dabbling ducks; diving ducks are occasionally affected. Visible cysts can also be found in infected rabbits and rodents. Microscopic cysts are found in other animals, including geese and deer.

**PRECAUTIONS AND PREVENTION** Although the species that infect common game animals, such as waterfowl, rabbits, and deer, have not been shown to infect humans, hunters are advised to thoroughly cook meat to an internal temperature of 150°F or freeze the meat to -4°F to kill the parasites. Heavily infected muscle may not be appealing to eat. Raw infected meat should not be fed to dogs or cats.

People can become infected by *S. hominis* and *S. suihominis* by eating undercooked beef and pork, respectively.



**Right:** Male mallard duck with heavy *Sarcosystis* infection. Photo courtesy of the DEC Wildlife Health Unit.