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Purdue experts: Fall no relief from diseases plaguing man, beast

WEST LAFAYETTE, Ind. – The coming of fall does not lessen the threat from West Nile virus or other zoonotic illnesses – diseases that can affect both people and animals – but Purdue University experts say most of these diseases are both avoidable and treatable. Mosquito-borne West Nile is only one of possibly hundreds of such illnesses, which can proliferate any time of the year. People shouldn't let their guard down this time of year even with West Nile because, depending on weather, October can be among the worst months for mosquitoes, Purdue entomologists say.

Last October, Indiana recorded its first West Nile fatality in a horse. This year, by the end of September, the illness had infected more than 3,500 horses nationwide and about 2,200 people, causing 95 human deaths.

Many other zoonotic diseases aren't spread by mosquitoes, and most aren't passed directly from animals to humans, says Larry Glickman, Purdue School of Veterinary Medicine professor of epidemiology and environmental health. The general public is familiar with many of these ailments, such as rabies and Lyme disease, but others, such as Ehrlichiosis and larva migrans, are relatively unknown.

"Zoonotic diseases run the whole gamut of types of organisms," Glickman says. "Some of these organisms don't appear to cause disease in the animal that harbors them, while others are as toxic to the animal host as they are to the human or animal to which the illness is passed."

Experts stress that exposure to the majority of these diseases, and their severity if contracted, can be minimized through preventative measures, proper hygiene and prompt treatment.

Viruses, bacteria, parasites and a protein form, called prions, also can cause zoonotic diseases. The latter causes bovine spongiform encephalopathy (BSE), commonly called mad cow disease, as well as its human variant Creutzfeldt-Jakob disease, and probably chronic wasting disease in deer and elk.

Leon Thacker, Purdue veterinary pathologist and head of the Indiana Animal Disease Diagnostic Laboratory on the West Lafayette campus, says his office tests for all types of zoonotic diseases. They includes rabies, West Nile, leptosporosis and even mad cow, although no cases of that illness or its variants have ever been found in the United States.

"In the diagnostic laboratory we screen for BSE in animals that we suspect might have been infected," Thacker says. "We see a number of animals that die from diseases caused by parasites, bacteria and viruses. Many of these illnesses could affect people."

Animals often provide a sentinel system for people, as was the case with West Nile virus when birds and horses were diagnosed with the disease before any human cases were reported in Indiana, Thacker says.

"When animals contract a disease, it's often a warning to people that the illness is moving into the area, and it's time to take measures to prevent its spread," he says.

This is true with insect-borne diseases such as West Nile virus, Lyme disease, Rocky Mountain spotted fever and Ehrlichiosis, a long-recognized canine disease. In dogs,

Ehrlichiosis can cause chronic weight loss, paralysis, blindness and brain damage. In humans, it's an emerging zoonotic disease that causes acute respiratory distress and is potentially fatal – but no evidence exists that dogs can transfer it directly to people. Mosquitoes are the carriers, or vectors, of West Nile virus; ticks carry Lyme disease, Rocky Mountain spotted fever and Ehrlichiosis. Vectors bite an infected host, then transmit the bacteria or virus to another animal or person that may contract the disease. It can take as long as two years for the tick to complete the cycle that allows the illness to transfer to a new host.

The best way to avoid mosquito- and tick-borne diseases is to limit exposure to the insects, says Ralph Williams, Purdue entomology professor and an expert on disease-spreading insects.

For protection from both pests, wear light-colored clothing with long-sleeve shirts and long pants and use insect repellent containing diethyl-meta-toluamide (DEET), says Williams.

"It's also important to remove ticks from yourself and from pets as soon as possible," he says. "Because it takes up to 24 hours for a tick to pass on a pathogen after it attaches itself, checking for ticks regularly and removing them immediately can prevent you or your pet from getting a disease."

Purdue experts say bacteria and parasites sometimes spread disease by hiding in soil, water and food. Bacterial food-borne diseases shared by man and animals include *Campylobacter* enteritis, *E. coli* infections, listeriosis and salmonellosis.

A few zoonotic diseases result from direct contact with an animal. The best known is rabies, an old virus found almost worldwide. Bats are the major carriers and reservoirs of rabies in most regions. On the East Coast through Ohio, secondary culprits are raccoons. In most of the Midwest, Texas, and much of California, skunks, and in some areas, coyotes and foxes are the biggest carriers after bats.

"Rabies occurrence has changed over the past 50 years in this country," Glickman says. "Before, we saw hundreds and hundreds of rabies cases in dogs and cats. The disease actually would spread from cat-to-cat, dog-to-dog, dog-to-cat, and then, of course, expose people."

"With development of good rabies vaccines and increased immunization programs by veterinarians, the incidence of dog and cat rabies declined markedly over a 30-year period. Now the major reservoir for rabies in the United States is wild animals, not dogs and cats."

According to the Centers for Disease Control, in 2000 the United States had 7,369 confirmed cases of rabies in animals, 93 percent of which were in non-domestic animals. That year, rabies killed five Americans, all except one from a bat bite.

A rabid animal doesn't have to bite to infect a person or another animal. The disease can spread when virus-laden saliva from an infected animal enters a cut or mucous membranes, such as in the mouth or eye.

Health departments are reducing rabies' further spread via wild animals by dropping edible bait packages containing rabies vaccine in areas that harbor possible disease carriers.

Examples of the hundreds of zoonotic diseases include:

- Bartonella, or cat scratch disease, like rabies, can spread directly from an infected animal to humans. Fleas or lice transport the bacteria from cat to cat.

A cat becomes the reservoir and the carrier of the bacteria when bitten by an infected insect. Infected cats usually don't show disease symptoms, but they can spread the illness to people. Most reported human cases of Bartonella have resulted from a cat bite or scratch. It's believed flea feces on the cat's claws facilitate transmission of the disease.

- Parasitic roundworms, or ascarids, which can be found in dogs, cats and raccoons, can cause a disease called larva migrans in humans. Roundworms live in the animals' intestines and don't usually harm the natural host — the dog, cat or raccoon. But in humans, the disease can damage the liver, lungs, eyes, brain or skin.

People become infected by ingesting roundworm eggs or larvae. Children are exposed to these worms by playing in an area where a dog or raccoon has defecated. This is especially dangerous for children who eat dirt or other material exposed to egg-laden feces.

- Dog roundworm, or *Toxocara canis* can cause two different syndromes. One is a systemic, allergic-type disease in which the larvae migrate to the lungs, liver and muscles. In the other the larvae go to the eye. It only takes one larva to cause blindness. The CDC estimates that about 500 children a year are blinded by dog roundworm. Glickman developed a diagnostic test to detect the dog parasite in people. Eye doctors and the CDC now use it to confirm larva migrans. A slightly different test is used for diagnosing raccoon roundworm, called *Baylisascaris procyonis*.

Through his studies Glickman has determined that dog roundworm infects between 5 percent and 20 percent of children at some time in their lives. Fortunately, few suffer permanent damage. However, the raccoon roundworm is much more dangerous than the dog roundworm because the larvae seem to hone in on the brain. The damage raccoon roundworm causes can include permanent mental disability and even death.

- Leptosporosis is considered the most widespread zoonotic disease worldwide. Its incidence in dogs is rising in the United States, although human cases here are still relatively rare, Glickman says.

Infected animals contaminate soil and water with their urine. In both people and animals, the bacteria can be transferred through the placenta, by contact with saliva, by eating contaminated food and from the soil and water from which it can travel through the skin and mucous membranes. It is the number-one cause of kidney failure in dogs and also can damage the liver.

Recent cases include triathlon athletes competing in Illinois who developed leptosporosis from swimming in a lake infected with a lepto organism.

"This may have come from farm runoff or maybe from raccoons while they were drinking and feeding from the lake," Glickman says.

If leptosporosis is diagnosed early enough, whether in a person or a dog, it can be readily treated with penicillin or tetracycline, he says.

For years, dogs have been vaccinated against two types of leptosporosis, but over the past 15 years new variants have surfaced, Glickman says. While any breed can be affected, the disease is more common in larger breeds, such as setters and retrievers that are outside most of the time.

Both people and domestic animals can avoid most zoonotic diseases through good hygiene, elimination of disease-carrying insects, elimination of areas that can harbor bacteria and parasites, and proper veterinary care for animals. Most of these diseases can be successfully treated if diagnosed early.

"What makes zoonotics so fascinating is that each disease has its own dynamics in the host, in the infected individual, in the manner in which it's transmitted, how it's maintained, and how you prevent it," Glickman says.

Writer: Susan A. Steeves, (765) 496-7481, ssteeves@purdue.edu

Sources: Larry Glickman, (765) 494-6301, ltg@purdue.edu

Leon Thacker, (765) 494-7440, thackerl@purdue.edu

Ralph Williams, (765) 494-4560, rew@purdue.edu

NOTE TO JOURNALISTS: Media wishing interviews with the expert sources may contact Susan Steeves at (765) 496-7481, ssteeves@purdue.edu.