

Killer in the Tool Shed

Hantavirus kills 35% of those it infects. It makes sense to take the necessary precautions.

by Ed Haag



Danger doesn't always lurk in obvious places. Who would have believed that picking up a broom and sweeping out a mouse-infested outbuilding would put your life at risk? But that, according to wildlife specialists and the U.S. Centers for Disease Control (CDC), is precisely what is happening when that dust begins to fly.

That isn't to say that the troublesome rodent hasn't created problems for us in other ways. Since man first started farming, the mouse has been the bane of the barnyard. Look no further than its name. Mouse, in ancient Sanskrit, means thief.

It is a creature whose penchant for mischief is only matched by a reproductive system that seems in perpetual overdrive. And now, with the emergence of hantavirus pulmonary syndrome (HPS), a new and lethal dimension has been added to man's struggle against the ubiquitous rodent.

"Breathing in the HPS virus that is shed in deer mouse feces is the main source of transmission of hantavirus to humans," says Carolyn Nistler, associate wildlife specialist at Montana State University's (MSU's) Animal and Range Sciences Department.

In a study focusing on the longevity of puumala hantavirus (PUUV) — a European hantavirus carried by voles — conducted by Swedish and Finish researchers in 2006, it was determined that feces excreted by experimentally infected donor bank voles remained infectious for five to 11 days at room temperature and up to 18 days at 4° C, but were inactivated after 24 hours at 37° C.

These results demonstrated that hantavirus transmission does not require direct contact between rodents, or between rodents and humans, and that the indirect transmission of PUUV through a contaminated environment takes place among the rodents for a prolonged period of time. The results also have implications for safety recommendations for work with hantaviruses and for preventive measures.

You don't want this

A person infected with HPS, commonly referred to as hantavirus, experiences severe and acute respiratory distress that usually

degenerates to a point at which he or she requires supplemental oxygen. This can occur as quickly as 72 hours in a previously healthy individual, but recent studies show that an infected person can remain symptom-free for up to five days before exhibiting signs of clinical hantavirus.

Other indicators of infection include fever, chills, myalgia, headache and gastrointestinal symptoms. One-third of those who contract hantavirus die from the infection.

While the number of cases for the nation is relatively low — fewer than 500 since 1993, when researchers first developed the ability to diagnose the disease — its lethality and demographics and the lack of any effective universal treatment should set off the alarm for those living in areas where deer mice proliferate.

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— Carolyn Nistler

"Farmers and ranchers are at the top of the list for those most likely to contract hantavirus," Nistler says. "And with 35% of those infected with the virus dying, prevention is the key for that high-risk group."

Of the 465 cases reported in 30 states, more than three-quarters of patients with HPS have been residents of rural areas, 78% have been white and 64% male.

Nistler adds that the incidence of deer mice carrying hantavirus is another reason for concern. Researchers across the West have been trapping and testing the rodents since 1993. The percent of captured deer mice that have been exposed to the virus ranges from 10% to 30%. One University of Utah study indicates that that percentage has been climbing in recent years.

Ounce of prevention

Recent research released to the CDC shows that people who became ill with hantavirus lived in areas where deer mice could be found. While most contracted the virus after being in frequent contact with the rodents and/or their droppings and did see physical evidence of their presence, some who contracted the disease could not recall seeing rodents or their droppings prior to their infection.

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CDC researchers conclude that visual identification of mice or their feces isn't always the most effective way to determine if an area has been contaminated with hantavirus. For this reason, the CDC recommends that those living in locations where the carrier rodent is known to inhabit make extra efforts to maintain a high level of cleanliness even in spots where mouse activity isn't visible to the human eye.

Hantavirus prevention measures endorsed by the CDC involve two sets of actions:

1. Clean existing sites contaminated with deer mice feces.
2. Exclude or eliminate mice from areas where contaminated feces might pose a threat to humans.

Clean site, reduce risk

When making recommendations to ranch owners and other rural residents facing the prospect of cleaning up a potentially contaminated site, Nistler emphasizes the importance of following the appropriate procedures. She notes that it is ironic that one of the most common ways to contract hantavirus is by inappropriate cleaning measures, such as dry sweeping or vacuuming before donning the recommended safety gear and applying liquid disinfectants.

"Whatever you do, you don't want to raise any dust," she says. "Inhaling dust contaminated with the virus is one of the surest ways to contract hantavirus."

The first step in cleaning an area you believe might have been contaminated by deer mice is to put on a respirator and rubber gloves. Before entering areas that have been closed for a while, open them and air them out before you begin cleaning.

Cleaning is accomplished by thoroughly wetting the contaminated areas with detergent or liquid to deactivate the virus. Most general-purpose disinfectants and household detergents are effective. A hypochlorite solution prepared by mixing 1½ cups of household bleach in 1 gallon of water may be used in place of commercial disinfectant. Once everything is wet, take up contaminated materials with a damp towel, then mop or sponge the area with disinfectant.

Spray dead rodents with disinfectant, then double-bag along with all cleaning materials and bury or burn — or throw out in an appropriate waste-disposal system. If burning or burying isn't feasible, contact your local or state health department about other disposal methods.

Once the cleanup is complete, wash your gloves with disinfectant or soap before taking them off, then thoroughly wash your hands with soap and warm water.

Eliminating the culprit

John Steuber, director of wildlife services, U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS), in the state of Montana, has often been called upon to share his expertise on rodent control with various farm groups throughout the western states. In his presentations he stresses the importance of sealing all possible entryways.

"Exclusion is probably your most cost-effective way of controlling rodents," he says. "But, this can be difficult, because they can get through very small openings."



►**Above:** They may be cute and seemingly harmless, but handling deer mice, alive or dead, without a respirator and gloves dramatically increases your risk of contracting the deadly hantavirus.

►**Right:** Live traps are used by wildlife biologists to monitor incidence of hantavirus in rodent populations. Note the use of gloves.



Caution dictates that all openings larger than ¼ inch (in.) across be sealed with mortar mix, sheet metal or a heavy hardware cloth. Particular attention should be paid to openings and cracks in the walls, broken windows, holes in the eaves and open spaces under doors. Any gaps where pipes or wires enter through walls and floors should be plugged with steel wool.

His advice to anyone interested in mouse-proofing an entire building, whether it is a farmhouse or a food storage facility, is to first draw a diagram of the surrounding area, carefully noting all locations that might provide cover for mice.

Once identified, these “infestation hot spots” must be modified or removed. Trash piles should be eliminated, and equipment and material stored against the building should be removed. All grass in the area should be cut short, and any thatch heavy enough to shelter mouse runs should be raked and removed. Specific attention should be paid to the exterior perimeter of the building.

These actions will deprive the mice of hiding areas, eliminate the nesting locations critical to their propagation and allow predators such as cats, ferrets, hawks and owls to perform their tasks more efficiently.

To identify rodent movement in open structures, such as outbuildings, Steuber recommends painting a 12-inch-wide white strip on the floor outlining the interior perimeter. “Mice run along walls,” he says. “The first place you are going to find droppings is there.”

When dealing with buildings that are already infested, Steuber recommends including an eradication program. In most cases this involves a combination of baits and traps.

For those who are contemplating setting out poison baits, Steuber

has these words of caution. “Before using any bait over a year old check with the state department of agriculture to make sure that it is still labeled for use in that state,” he says, adding that those using poison baits should read the directions on the label carefully. “It is against the law not to follow the written instructions precisely.”

For those concerned about rodents carrying poison bait into areas where it can be inadvertently eaten by livestock, Steuber recommends using an enclosed metal trap baited with a secured paraffin block. “Unlike the old pellet baits, it is almost impossible for the mouse to move the bait to another location,” he says.

He also recommends that when setting bait boxes along the outside perimeter of a building they be secured to the footing.

When not using poison baits, Steuber recommends standard snap traps. Inside the building these should be placed against the exterior wall near entryways and in areas where mouse droppings are concentrated. The bait should face into the wall in order to trap those animals using the wall as a run. Steuber has had the best luck using peanut butter mixed with oatmeal.

“The oatmeal gives the bait texture and prevents the mouse from licking the trigger clean without being caught,” he says.

For larger infestations Steuber uses a spring-loaded catch-all trap that flips the mouse into a holding area and automatically resets itself for the next mouse.

No matter what type of baits or traps are used, Steuber has this last bit of advice: When disposing of mice and their droppings always use a respirator and gloves. It is the best way to stop a thief from becoming a murderer.

