



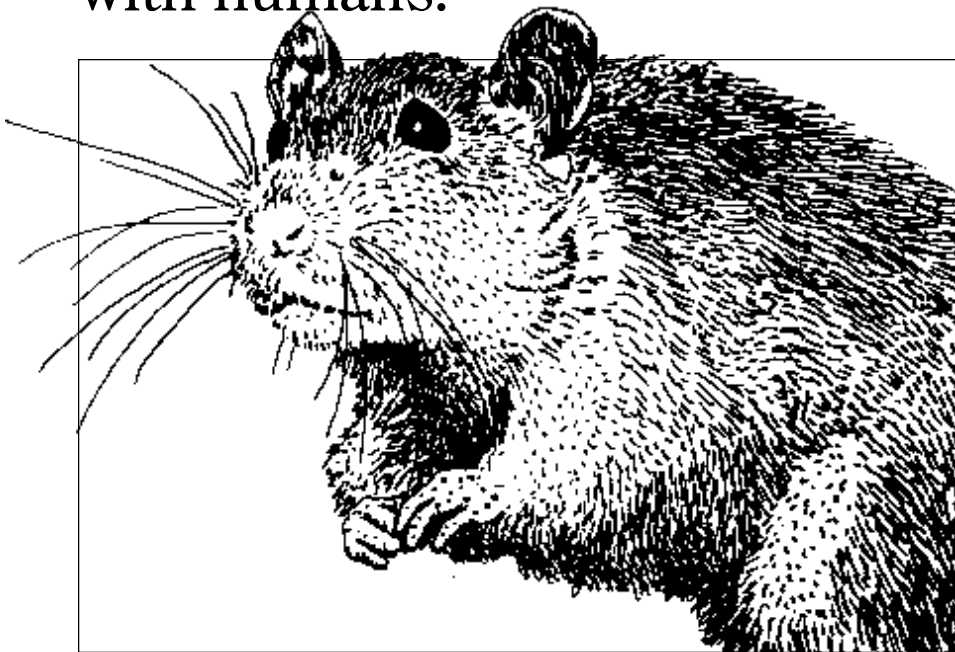
Managing Commensal **Rodent** Problems in Kentucky

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The house **mouse** (*Mus musculus*) and Norway **rat** (*Rattus norvegicus*) are two of the most troublesome and damaging rodents in Kentucky. These rodents are called commensal rodents because they live in such close association with humans.

Several characteristics of commensal rodents have allowed their populations to flourish. These characteristics include: (1) their ability to survive in a wide variety of climates and habitats, (2) a varied diet, and (3) a high rate of reproduction. Often, homeowners first notice house mice in the winter after the rodents' fall migration indoors in search of food, warmth, and shelter. It is extremely difficult to control house mice once they have entered a home or other building.

Many people tolerate mice in their homes or businesses because they seem less objectionable than rats. However, mice infest far more structures than do rats and can cause considerable damage.



Why Control Commensal Rodents?

It is difficult to place an economic value on the damage rodents cause. The greatest economic loss is not from how much they eat, but what must be thrown out because of damage or contamination. Food, clothing, furniture, books, papers, heirlooms, and many other household items are contaminated by mouse droppings or urine, or damaged by their gnawing. Rodents also gnaw through electrical wires, causing fires or appliance failure.

Rats can cause structural damage to buildings through their gnawing or burrowing. Rats can also cause considerable damage to insulation when they burrow and form nests in walls and attics.

Rats and mice also may transmit diseases to humans or livestock. The most notable disease transmitted by mice is salmonellosis (bacte-

rial food poisoning) when food is contaminated with infected rodent feces. Rodents may also transmit murine typhus, leptospirosis, trichinosis, ratbite fever, reckettsialpox, lymphocytic choriomeningitis, and dermatitis.

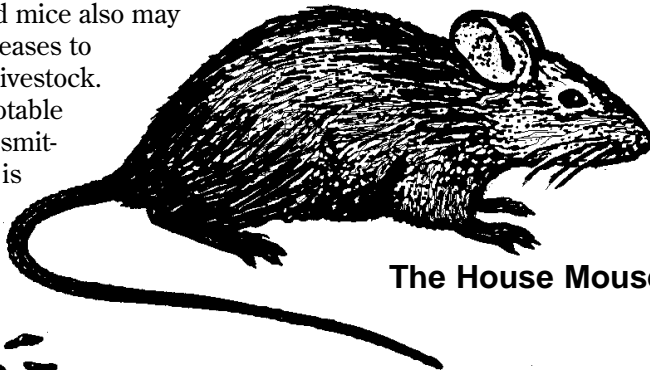
Rodent Biology and Facts

House mice are small, brownish or grayish, nondescript, agile rodents with large ears and small eyes (see below). They have a 3- to 4-inch semihairless tail attached to a 2 1/2- to 3 1/2-inch body. Adult house mice weigh between 1/2 to 1 ounce. The Norway rat, often called the brown or sewer rat, is much larger than a house mouse, averaging 7 to

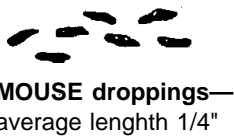
10 ounces. Rats are about 13- to 18-inches long complete with a 6- to 8 1/2-inch tail. They have coarse fur that is generally brown scattered with black on top and a grey to yellowish white belly.

Mice and rats are prolific breeders. Female house mice will have 5 to 10 litters annually with 5 to 6 young per litter. Female rats will have 4 to 6 litters every year with 6 to 12 young per litter. Mice and rats give birth 19 to 23 days after mating. Immature mice can breed at six weeks of age, and young rats can breed at 18 weeks of age. Rats have a life span of about 12 to 18 months; whereas house mice live about 9 to 12 months.

These rodents will eat almost anything, but mice in particular prefer seeds and cereal grains. Rats also like to eat meats, vegetables, and garbage. Mice and rats are also fond of foods high in fat and protein such as nuts, bacon, butter, and sweets. Keep these foods in mind when choosing a bait for snap traps. Mice are inquisitive "nibblers" and may make 20 to 30 visits to different food sites each night. Rats tend to be more cautious in their feeding habits, preferring certain foods over others. Rats also require water each day when feeding on dry food. Mice depend less on free-standing water and usually obtain enough from their diet.



The House Mouse



MOUSE droppings—
average length 1/4"



RAT droppings—
average length 3/4"



The Norway Rat



Commensal rodents do not need a large amount of living space. On any given day, rats normally do not travel farther than 100 to 150 feet from their shelter to obtain food and water. Compared to rats, house mice forage only short distances from their nest. This distance is usually not more than 10 to 25 feet. If enough food and water is available, these rodents need only travel a few feet. For this reason, traps and control devices must be placed in areas where rodent activity is most apparent. Rats and mice are nocturnal (active at night) and prefer to travel along walls and other edges. Keep these traits in mind when positioning your control devices. Mice are very inquisitive and will investigate every new object placed in their feeding territory. Thus, if your control devices are not initially successful, move them to a different location.

Rats and mice have remarkable physical abilities. When rodent-proofing structures, be aware of these abilities:

- Rats can crawl through an opening 1/2" in diameter. House mice can enter through an opening 1/4" in diameter.
- Mice have a vertical leap of more than 12 inches, and rats more than 36 inches.
- Rats can climb vertical pipes of any size if the pipe is within 3 inches of a wall or other supporting material. House mice can climb almost any vertical surface that is rough including wood, brick, metal, wire mesh, and cables.
- Mice can jump from a height of 8 feet to the floor without injury. Rats can drop 50 feet without being killed or seriously injured.
- Rats have a horizontal leap of more than 8 feet and can reach as far as 13 inches along smooth vertical walls.
- Both species are capable swimmers if they need to be. House mice do not take to water as well as



RAT Tracks—

Figure 1.— Tracks such as these in dust or mud indicate the presence of rats.

rats do. Rats can swim as far as 1/2 mile.

- Both species can run horizontally along insulated electrical wires, small ropes, and the like with ease.

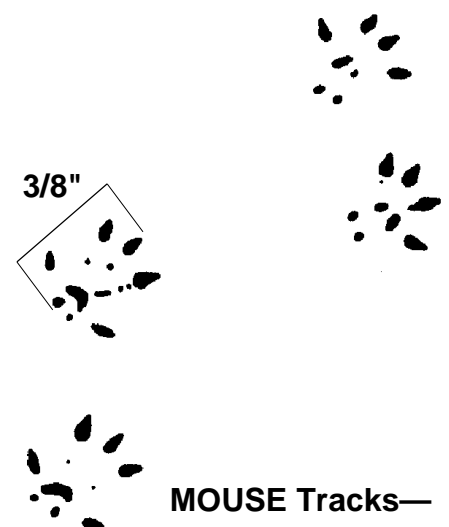
Determining the Presence of Rodents

The natural habits of mice and rats give homeowners evidence of rodent activity. The following are some of these “rodent signs”:

- **Droppings** may be found where rodents travel, near their shelters, or other places rodents frequent (see page 2). Droppings are usually the first evidence of rodents in a dwelling and are a key indicator of where you should place control devices. Be aware that certain insects, bats, and other species of mice have droppings that may be indistinguishable from house mice droppings.
- **Tracks**, including footprints or tail marks, may be seen on dusty surfaces or in the mud (figures 1 & 2). A tracking patch made of talc or flour can help you determine whether rodents are present.
- **Urine stains**, either wet or dry, will show up under ultraviolet (black) light. Look for this sign

along possible travelways and feeding areas.

- Rodent **sounds** such as gnawing, clawing, climbing in walls, running in the attic, and various squeaks are common at night.
- **Smudge or rub marks** can be found on beams, rafters, pipes, walls, or other places frequented by rodents. These marks come from oil and dirt rubbing off rodents’ fur along well traveled routes. House mouse smudge stains are small and difficult to detect.
- **Runs** (and **burrows** for rats) can be found next to walls, along fences, next to buildings, and under bushes or debris. Rats use the same routes



MOUSE Tracks—

Figure 2.—Smaller tracks such as these indicate the presence of house mice.

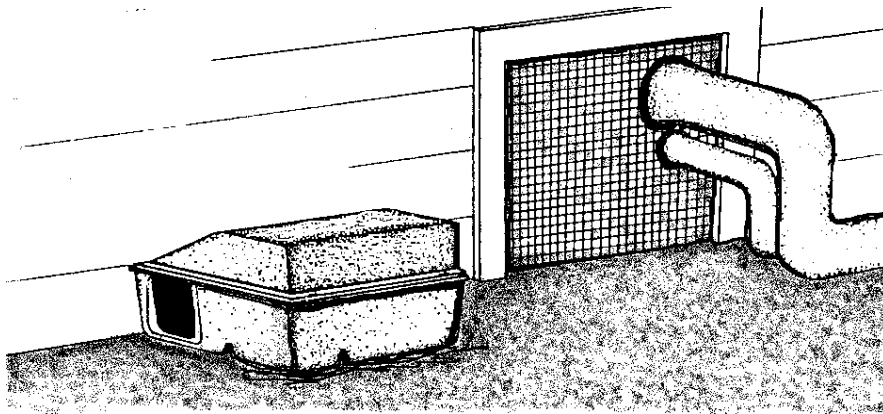


Figure 3.— Tamper-resistant bait boxes help prevent accidental poisoning and also protect the bait from moisture. Place poison bait boxes along travelways of rats and mice.

daily and their feet make a beaten pathway along the ground. House mice create nearly indistinct, dust-free trails that are not easily detected.

■ **Gnawing marks** can be visible on doors, ledges, in corners, in wall material, or other surfaces where rodents are present.

■ **Wood chips** the consistency of coarse sawdust around baseboards, doors, basement windows and frames, and kitchen cabinets are further evidence of rodents. The size of tooth marks frequently helps distinguish whether rats or mice are the culprits.

Control Tactics

Because mice and rats are prolific breeders, it is faster and cheaper to control them before their numbers get too high. To successfully control mice and rats you must “think like a rodent,” keeping in mind the animal facts and biology noted above. Long-term results are best achieved by using the following combined methods:

- reducing populations,
- sanitation, and
- rodent-proofing (exclusion).

Reducing Rodent Populations

Other than calling a private pest control operator, you have three control options: (1) toxic baits (called rodenticides), (2) traps, or

(3) glue boards.

Poison Baits

Rodenticides available to homeowners are formulated almost exclusively as food-based baits containing seeds or grain to attract the rodents. Most baits sold over the counter are anticoagulants containing a variety of active ingredients (See table 1 on page 8). These are slow-acting poisons requiring 3 to 5 days to cause death. The animals die from internal bleeding as a result of the loss of the blood’s clotting ability and damage to capillaries. Grain baits in a meal or pelleted form are available in small plastic, cellophane, or paper packets. These sealed “place packs” keep bait fresh and make it easy to place the bait in burrows, walls, or

other locations.

Rodents gnaw or chew into the packet to feed on the bait.

As you would with any poison, follow the label instructions completely and take great care to position baits in areas where children and pets cannot reach them. Dogs in particular will seek out and find baits in accessible areas.

If you have children or pets use a “tamper-resistant” bait box to secure the bait (figure 3). These boxes prevent accidental poisoning and also protect the bait from moisture. Be sure the bait box you buy is large enough to accommodate several rodents at one time and has a self-feeding hopper for holding the bait. Stations should have at least two 1-inch openings for mice and two 2 1/2-inch openings for rats. Placing rodent bait in the box also makes the bait more

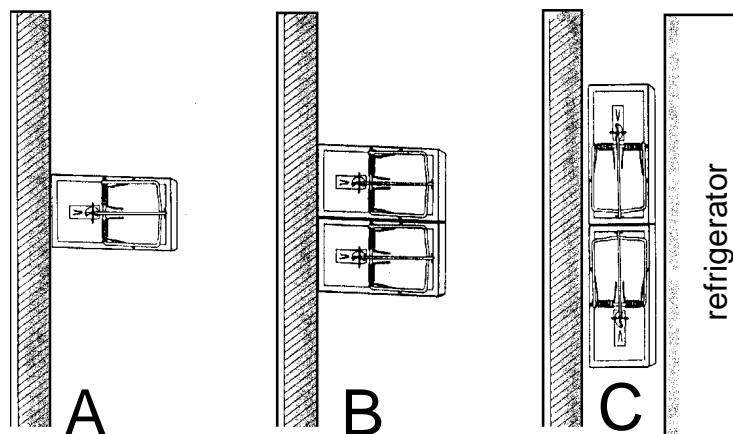


Figure 4.— Set traps along walls as shown in A & B so rodent passes over trigger. In tight spaces such as behind a refrigerator, two traps should be set (C).

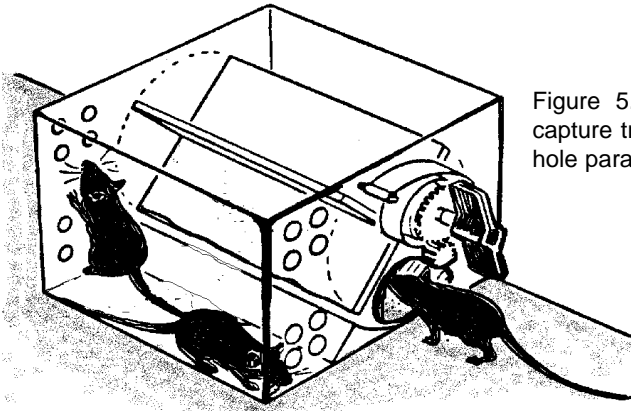


Figure 5.— Place multiple-capture traps with the entrance hole parallel to the wall.

attractive because the rats or mice will feel “protected” while feeding.

You can purchase bait boxes from a variety of farm supply stores, hardware stores, or supermarkets. Because mice feed only a short distance from their nest or shelter (called a harborage), you will achieve optimum control by placing multiple bait stations as close to the harborage as possible. Do not space bait boxes farther than 10 feet apart (preferably closer) for mice. Rats tend to forage for food over greater distances. Place baits in their travelways or near their harborage. Commensal rodents prefer to travel along walls and other edges rather than across open areas, so position bait boxes and other control devices flush with walls for best results. Do not expect the rodents to go out of their way to find the bait. Clearly label all bait boxes “Caution-Mouse/Rat Bait” as a safety precaution.

Be aware that poisoned rodents often die in inaccessible locations within a building, leading to persistent and unpleasant odors. If you find any dead rodents, dispose of them by burying them or placing them in plastic bags and putting them in the trash. Wear gloves when handling dead rodents to prevent disease spread. Store any unused bait in a locked cabinet out of the reach of children and pets.

Traps

If signs indicate you do not have a large rodent population, traps are generally preferred over poisons because they are less hazardous to

use around children and pets. In addition, because rodents are captured by the trap, they are not as likely to die in walls or other inaccessible areas and create odors. The simple wooden snap trap is easy to use and available at most supermarkets, hardware stores, or farm supply stores. Bait the traps by securing bacon, peanut butter, gum drops, chocolate, or fruit to the trigger with thread or a “twist tie.” For more effective control set in pairs (figure 4) or use traps that have an expanded trigger design. It often helps to leave the traps baited, but unset, until the bait has been taken at least once. Set snap traps perpendicular to the wall with the trigger against the vertical surface (figure 4).

Another type of trap available at most hardware and farm supply stores is the multiple-catch trap called a Tin Cat® or the Ketch-All®. This device can capture and hold a dozen or more mice before needing

to be emptied. These traps are expensive but can be effective, especially when trapping is done on a continual basis. Place multiple-capture traps with the entrance hole parallel to the wall (figure 5).

Use enough traps to make the endeavor short and decisive. Because mice seldom venture far from their harborage, space traps no more than about 10 feet apart in areas where mice are active. Place traps against a wall, behind an object, or in secluded areas where rodent droppings, gnawing, and damage are evident.

Glue Boards

An alternative to the use of traps are glue boards, especially for mice. Glueboards work like flypaper; when a rodent attempts to cross the glueboard, it gets stuck and suffocates. Place glueboards along walls or other areas where rodents frequent (figure 6). It is not necessary to bait glueboards, although bait can entice rodents onto the board in some situations. Glueboards lose their effectiveness in dusty areas unless covered. Cold temperatures may affect the tackiness of the glue and make the board less effective. If the glue from the board comes into contact with a pet’s fur or child’s skin, it can be removed with mineral or vegetable oil.

Check traps and glueboards every few days and dispose of dead rodents in plastic bags. Remember

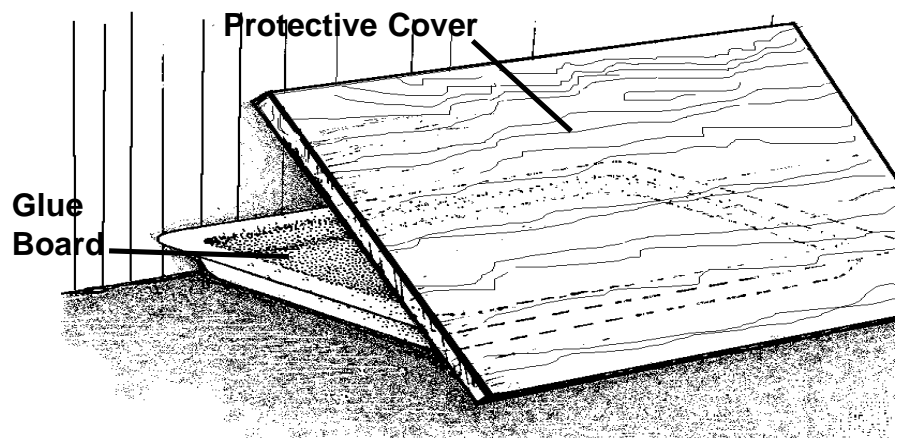


Figure 6.— Glue boards are an alternative to traps. Place glue boards along walls or other areas where rodents frequent.

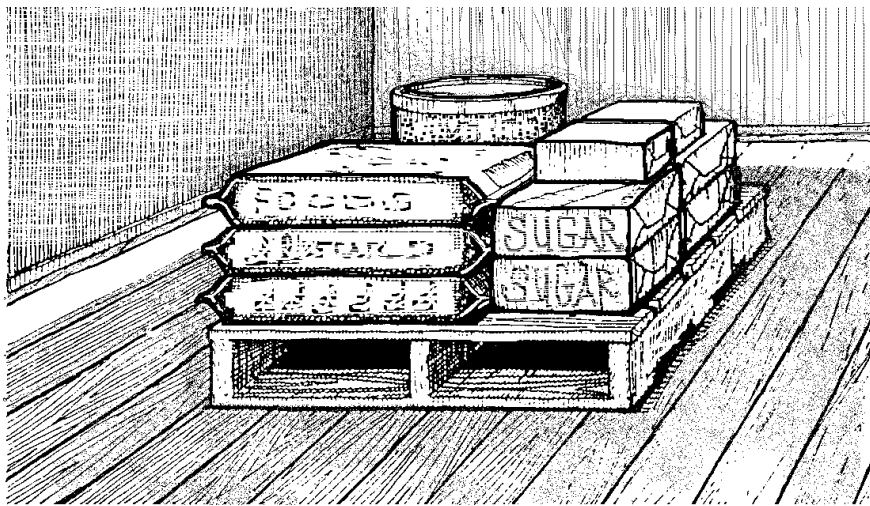


Figure 7. — Store items off the ground so you do not attract rodents and to make rodent detection easier.

to wear gloves when handling dead rodents.

Sanitation

Proper sanitation or good housekeeping will help reduce rodent problems, particularly in the case of rats. Because rodents prefer seeds and grains, store these items (including pet foods) in sealed containers. Don't forget food items that you store in garages or out-buildings. Weed seeds are a favored food of mice; therefore you should remove any weeds growing next to your house or other buildings. However, because mice can live in such small nesting areas and survive on tiny amounts of food, good sanitation (particularly on farms) alone will not eliminate an existing infestation. While good sanitation will seldom eliminate mice, poor sanitation is sure to attract rats and mice and will permit them to thrive in greater numbers.

Most buildings in which food is stored or used will support rodents if not rodent-proofed, no matter how good the sanitation. In addition, pay particular attention to eliminating places where rodents can find shelter. If they have few places to rest, hide, or build nests and rear young, they cannot survive in large

numbers. Store lumber, firewood, crates, boxes, sacks, gardening equipment, pipes, and other items off the ground so you do not attract rodents. Off-the-ground storage also makes it easier to detect any rodent populations you might have (figure 7 & 8). Do not allow garbage, trash, and garden debris to accumulate, and make sure your garbage

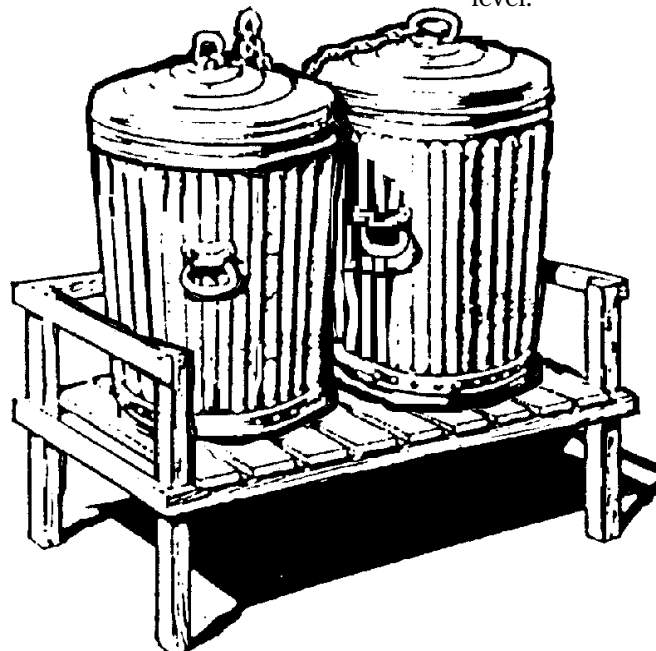


Figure 8. — Trash cans stored off the ground are less likely to attract rodents. Make sure containers have tight-fitting lids.

containers have tight-fitting covers.

Rodent-proofing

Once you have reduced or eliminated a rodent population and have removed the rodents' food and shelter, the final step in preventing further problems is to "rodent-proof" your property. The most successful—and permanent—form of rodent control is to "build them out." The best way to control rodents is to prevent their entry. Seal cracks and openings under doors (including garage doors), in building foundations and any openings for water pipes, electric wires, sewer pipes, drain spouts, and vents (figure 9). Because mice are able to squeeze through openings smaller than the diameter of a dime, any hole larger than 1/4-inch should be sealed with heavy duty wire screen (hardware cloth), heavy sheet metal, mortar, or coarse steel wool. Do not use plastic sheeting, wood, or any material the rodents could gnaw through. Make sure doors, windows, and screens fit tightly. If not, cover the edges with sheet metal to prevent gnawing. Because commensal rodents are excellent climbers, you must also seal any openings above ground level.

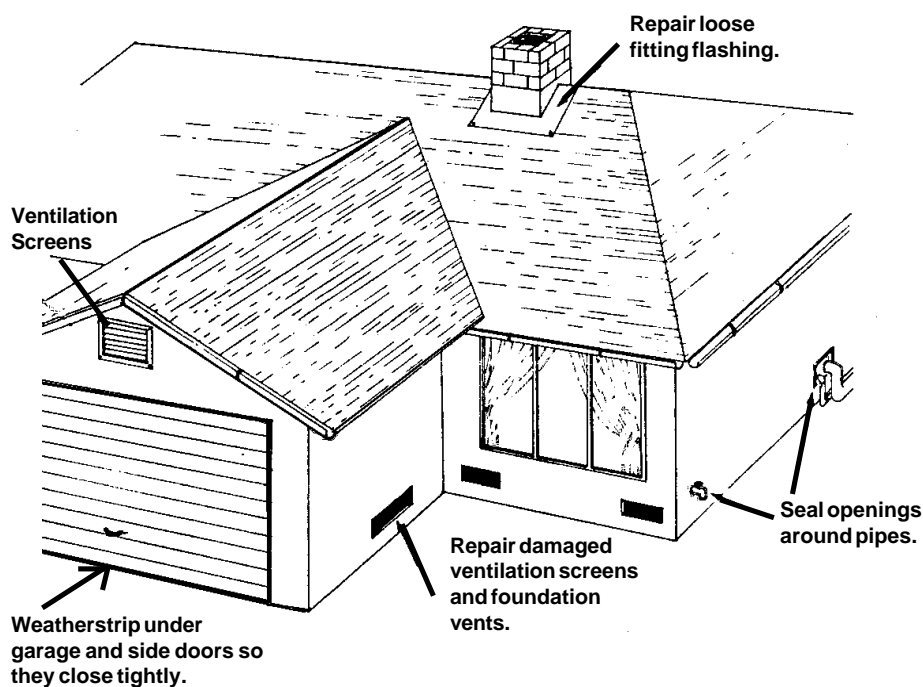


Figure 9. — Rats and mice can gain entry to buildings through a variety of openings.

Control Methods NOT Recommended

Sound and Electronic Devices

Although mice and rats are easily frightened by sudden, unfamiliar noises, they soon become accustomed to repetitive sounds. Ultrasonic sounds, those above the range of human hearing, have very limited use in rodent control for four reasons: (1) the rodents quickly become accustomed to the noise, (2) the devices produce a directional noise, (3) this directional noise does not penetrate objects, and (4) the sounds lose their intensity quickly with distance. There is little scientific evidence these devices will drive established mice or rats from buildings.

Predators and Biological Control

Although cats, dogs, and other predators may kill mice and rats, they do not provide effective control in most circumstances. It is not uncommon to find rodents living in very close association with dogs and cats. Rats frequently live beneath a doghouse and soon learn to feed on the dog's food when he is asleep or absent. Mice and rats can also obtain much of their food from the pet's dish or from what the pet spills.

Repellents

Although mice and rats naturally avoid some odors and tastes, no repellents have been found to solve a rodent problem. There are no rodent repellents registered for use in Kentucky.

Fumigants

While fumigants (poison gases) can be very effective, they are dangerous for home or business use. Fumigants are most often used to control rats in their burrows outdoors. Because fumigants are **HIGHLY TOXIC** to humans and animals, only licensed pest control operators should use them in and around buildings.



Table 1. Rodenticides and the percent active ingredient usually found in food baits for house mouse and rat control.

Common Name <i>(brand name)</i>	Chemical Name	Percent Active Ingredient used in Food Bait
Brodifacoum (Havoc, Talon)	3-{3-[4'-bromo(1,1'-biphenyl-4-yl)-1,2,3,4-tetrahydro-1-naphthalenyl]-4-hydroxy-2H-1-benzopyran-2-one	0.005
Bromadiolone (Maki, Contrac)	3-{3-[4'-bromo(1,1'-biphenyl)-4-yl]-3-hydroxyl-1-phenylpropyl}-4-hydroxy-2H-1-benzopyran-2-one	0.005
Bromethalin (Assault, Vengeance)	N-methyl-2,4-dinitro-N-(2,4,6-tribromophenyl)-6-trifluoromethyl) benzenamine	0.01
Chlorophacinone (RoZol)	2-(p-chlorophenyl) phenylacetyl)-1,3-indandione	0.005
Cholecalciferol (Quintox, Rampage)	9,10-Seocholesta-5,7,10(19)-trein-3-betaol	0.075
Diphacinone (Ramik) (Di-Blox)	2-diphenylacetyl-1,3-indandione	0.005
Fumarin (Coumafuryl)	3-(0-acetylonylfufuryl)-4-hydroxycoumarin	0.025
Pival (Pindone)	2-pivalyl-1,3-indandione	0.025
PMP (Valone)	2-isovaleryl-1,3-indandione	0.055
Prolin	3-(-acetylonylbenzyl)-4-hydroxycoumarin + sulfaquinoxaline	0.025
Warfarin	3-(0-acetylonylbenzyl)-4-hydroxycoumarin	0.025

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