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# Commensal Rodents: Wildlife Damage Management Series

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**Wildlife Damage Management Series**

# *Commensal Rodents*

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Jack H. Berryman Institute
Utah Division of Wildlife Resources
Utah Department of Agriculture and Food
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The term "commensal" means "living with or in close association to humans." Although many species of rodents occasionally may be found around humans, the term commensal rodents refers specifically to mice and rats. In Utah, house mice (*Mus musculus*) and Norway rats (*Rattus norvegicus*) are the most common commensal rodents (Figure 1).

Almost everyone is familiar with the appearance of house mice and Norway rats. House mice are small (< 8 inches in total length) rodents with a slender body, pointed nose, and small protruding eyes. The tail of house mice is hairless with obvious scale rings. White-footed mice and harvest mice are often mistakenly identified as house mice. Norway rats are much larger than house mice (12 to 18 inches in total length) and appear stocky. Norway rats and house mice are not a native species in North America, but were transported from Europe to the U.S. during colonial settlement.

## GENERAL BIOLOGY AND BEHAVIOR

House mice are nocturnal, although in some areas they may be active during the day. House mice often burrow into and nest in the ground or under structures

**Figure 1. Norway rat, *Rattus norvegicus* (left), and house mouse, *Mus musculus* (right).**

when other shelter is not available. In most areas, the beginning of cold weather in the fall will cause mice to search for shelter in houses, barns, or granaries. These structures can support very large populations of mice if control measures are not taken. Mice nests are constructed of fibrous material that may include paper, burlap, or fabric and often are found under floors and in the walls of buildings. House mice are extremely prolific and breed year-round. Females can produce as many as 13 litters each year ranging in size from 3 to 10. Following birth, young mice grow rapidly and reach sexual maturity when they are 6-8 weeks old.

Like mice, Norway rats are also nocturnal animals that become active at dusk, when they begin to seek food and water. Rats are often found in houses, farm buildings, and warehouses and frequent the walls, floors, and foundations of these buildings. Rats construct nests similar to that of house mice, but rat nests are much larger. Norway rats are prolific breeders and can breed throughout the year. Under favorable conditions, female rats can birth as many as 8 litters per year. Litters can include as many as 15 young, but typical litter sizes range from 6 to 8. Young rats mature quickly, being weaned at 3 weeks old and reaching sexual maturity within 3-4 months.

## COMMENSAL RODENT PROBLEMS

House mice and Norway rats are considered two of the most destructive and costly wildlife species that exist in the U.S. Unfortunately, accurate estimates of the economic costs of mouse and rat damage are lacking. In one study, 76% of grain samples in a Midwestern state were contaminated with mouse droppings. Another study discovered that a small colony of Norway rats could contaminate 70% of wheat in 12-28 weeks after given access to the grain. Mice and rats also are major causes of structural damage to houses and other buildings. Mice, in particular, are very destructive to rigid foam and other types of insulation in the walls of buildings.

Both mice and rats will eat virtually anything that is edible, but are strongly attracted to human dwellings because of the large source of food in the form of garbage. Both mice and rats can spread parasites and diseases, many of which are dangerous to humans. Most are aware that rats helped to spread the bubonic plague in Europe, one of the most destructive epidemics in human history. In fact, hungry rats sometimes will bite children and adults during sleep. For these reasons, you should never touch rats or mice. If you need to handle a mouse or rat (e.g., to remove one from a trap), or any other species of wildlife, you should always wear the appropriate protective clothing (e.g., leather or plastic gloves).

## LEGAL STATUS

Utah state law does not protect house mice and Norway rats. They may be controlled using any pesticide registered by federal or state authorities for this purpose, or they may be controlled by use of mechanical methods such as traps.

## CONTROL

**Identification of Damage**

When house mice and Norway rats live in or around structures, they almost always cause some damage. They commonly gnaw on materials inside the walls or floor. Evidence of this gnawing activity may be visible on doors, ledges, in corners, or on stored materials. Entry holes left in the walls or floors by mice are smaller in diameter than those of rats (1 ½ inches in diameter for mice, 2 inches or larger for rats). Mice and rats leave droppings along their runways, in feeding areas, and near shelter. Mouse droppings are usually about ¼ inch long, whereas those of rats typically are ¾ inch long. If mice or rats inhabit a building, it is common to hear them gnawing or running in walls and floors, particularly at night. Finally, visual sightings of mice and rats are common in areas they occupy.

**Habitat Modification**

Good sanitation is very effective in reducing mouse and rat populations in human dwellings. Unfortunately, even the best sanitation will not eliminate all mice and rats. However, it will make it easier to recognize mouse and rat sign (e.g., droppings, gnawing activity) and evaluate whether other controls should be implemented. Proper storage and handling of food materials, feed, and garbage is usually stressed as a method of rodent control. The removal of vegetation and debris around structures can discourage mice and rats from entering those dwellings. Placing a strip of gravel around dwellings also can prevent mice and rats from burrowing under the foundation and gaining access to the structure.

**Exclusion**

Physical barriers can prevent mice and rats from gaining access to structures where food and shelter is available. Rodent-proofing your dwelling is a permanent and effective means of control that can prevent much damage from occurring. Methods used to exclude mice and rats are similar, but you should be aware that mice can enter openings much smaller than those used by rats. Thus, if you are concerned about controlling mice, you should seal all openings larger than ¼ inch; if you are concerned only about rats, it is necessary to seal all openings larger than ½ inch. To seal openings to structures, you should use heavy materials that will resist gnawing. These materials include concrete mortar, galvanized sheet metal, and hardware cloth.

**Repellents**

Mice and rats find some chemical tastes and odors distasteful, but chemical repellents usually are not a practical method of controlling rodent damage. The agency responsible for regulating chemicals used on wildlife, the Environmental Protection Agency (EPA), currently approves of only one chemical for use in repelling house mice and Norway rats. Ro-pel® is registered by the EPA for deterring mice and rats from gnawing on trees, poles, fences, shrubs, and other objects. Unfortunately, little information is available on the

effectiveness of Ro-pel® in repelling mice and rats. As with most repellents, mice and rats may become accustomed quickly to the chemical and gnaw on objects even though the repellent has been applied.

**Frightening devices**

Mice and rats are wary animals and can be frightened by loud or unfamiliar sounds. However, they will quickly become accustomed to new sounds and thus tend to ignore them. Many devices that produce ultrasonic sound have been marketed as an effective and easy way to frighten mice and rats away from an area. Unfortunately, advertising claims made by companies that produce ultrasonic devices have not withstood scientific scrutiny. The studies that have been conducted discovered that mice and rats may be initially frightened by these devices, but usually return to the area and resume normal activities. Similarly, many devices which produce electromagnetic fields have been marketed as an effective rodent repellent. Again, however, scientific evidence clearly shows that these devices are not useful in repelling rats or mice. For these reasons, ultrasonic and electromagnetic devices are not recommended as a solution to rodent problems.

**Toxicants**

Toxicants are often used to control mice and rats in houses and other structures. Among the toxicants used for rodent control, anticoagulants are used most commonly. The first anticoagulants required that mice and rats feed on the bait multiple times to receive a lethal dose. Since then, single dose anticoagulants, such as brodifacoum and bromadiolone baits, have been developed and can be lethal after 1 feeding.

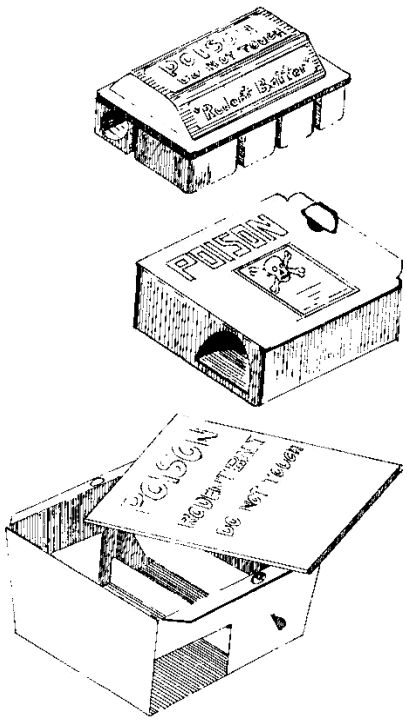


**Figure 2. Examples of commercially manufactured rodent bait stations.**

Although anticoagulants can be bought in concentrated forms and used to make your own baits, most homeowners prefer to purchase ready-to-use baits. These may come in paper packs that keep bait fresh and allow easy placement into burrows, walls, or other locations. Wax blocks have also been used for anticoagulant formulations and may be useful where moisture may cause the baits in paper packs to spoil. Finally, bait stations are often used and may increase the effectiveness and safety of rodenticides. Bait stations protect bait from moisture, keep other animals and children away from the bait, help prevent accidental spilling of bait, and allow easy inspection of the bait to is if mice or rats have been feeding on it. Again, some people construct their own bait stations, but most individuals prefer to buy pre-made bait stations (Figure 2). Most farm supply or hardware stores should have them in stock or can order them for you. Be sure you purchase a bait station made for the animal you want to control—bait stations made for mice are smaller than that for rats. Regardless of the formulation used to deliver the toxin, you should be aware that mice and rats can learn to identify and avoid toxic baits; this tendency is known as "bait shyness." However, you should be aware that mice and rats can learn to identify and avoid toxic baits; this tendency is known as "bait shyness." To avoid bait shyness, it may be necessary to prebait (offering rodents similar but nontoxic bait prior to applying the toxic bait) an area prior to using toxic baits. Before using anticoagulants in any form, you should be aware that death does not immediately follow ingestion of a lethal dose. Mice and rats that have ingested a lethal dose may die while in walls or floors and their decomposition can cause unpleasant odors.

Several non-anticoagulant baits are also used to control rodent populations. Of these, zinc phosphide baits are most common. Although zinc phosphide baits are effective in controlling mouse and rat populations, it is considered a restricted-use pesticide and can only be used by certified applicators. If you are interested in becoming acertified applicator, contact your local Utah State University county extension office.

As with all toxic chemicals, you should keep all rodenticides away from children and pets. For more information about these rodenticides, their uses, and how to obtain them, contact your local Utah State University extension office or any of the organizations listed at the end of this bulletin.

**Trapping**

Trapping is an effective and often used method of controlling mice and rats in human dwellings. Trapping offers a few advantages over the use of toxicants. Most importantly, trapping will allow you to witness your success in removing mice or rats and will allow you to physically remove the carcass, thereby eliminating odor problems that occur because of decomposition. Most often, trapping is done with the simple, wood-based snap traps found in hardware and other stores. Traps should be baited with a small piece of nutmeat, chocolate, dried fruit, or bacon. Peanut butter or marshmallows also are good baits. Although cheese is often used for bait, it

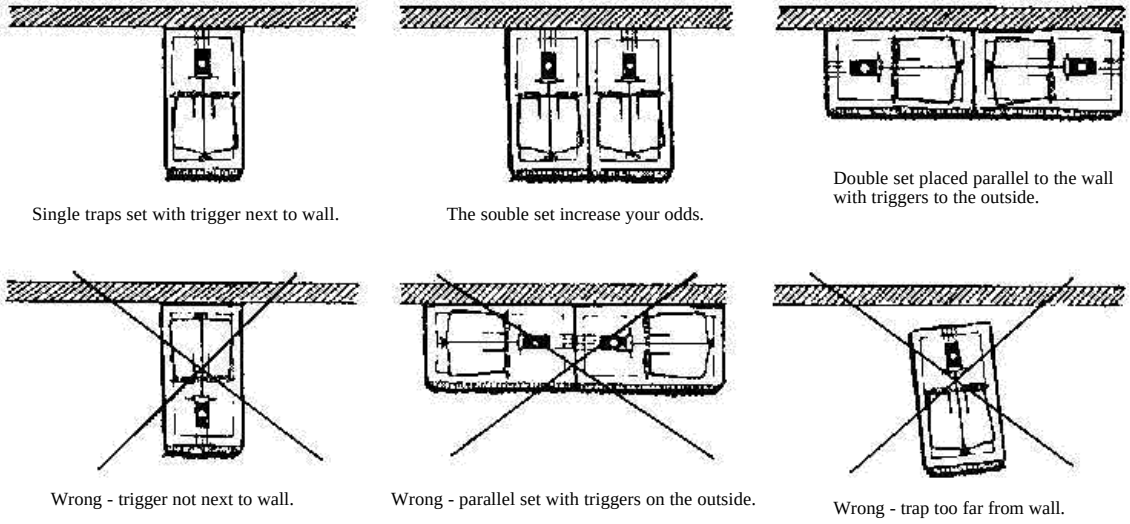


**Figure 3. Examples of proper trap placement.**

quickly become stale and losses its attractiveness. Traps should be set close to wall, behind objects, in dark areas, or in locations where mouse or rat activity has been observed. The traps should be set so that the mouse or rat will pass directly over the trap during their normal travel (Figure 3). Double traps can be used to increase the likelihood of capture. When removing rats or mice from traps, always wear protective gloves.

**Other Methods**

Fumigants (toxic gases) are sometimes used to control rats in their burrows at outdoor locations, but this is usually done to protect agricultural crops. Structural fumigation is also occasionally used to control rats and mice in dwellings or warehouses, but this can only be conducted by licensed pest control operators. In farm buildings or warehouses, shooting or clubbing can be an effective way to eliminate rats, but is not as effective for mice. Cats and dogs may kill some rodents, but typically are not useful in eliminating large populations of mice or rats.

## ADDITIONAL SOURCES OF INFORMATION AND ASSISTANCE

For further information, contact:

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USDA/APHIS Wildlife Services
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Salt Lake City, UT 84126
Phone – (801) 975-3307

**Additional Reading:**

Burt, W.H., and R.P. Grossenheider. 1976. A field guide to the mammals. 3rd edition. Houghton Mifflin Company, Boston, Massachusetts.

Hall, E.R. 1981. The mammals of North America. Volume 2, 2nd edition. John Wiley & Sons, New York.

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