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Research and Extension

Controlling House Mice

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THE HOUSE MOUSE (*MUS MUSCULUS*) IS ONE OF THE MOST COMMON AND ECONOMICALLY DESTRUCTIVE RODENTS IN THE UNITED STATES.

House mice contaminate and consume food intended for people, pets, and livestock. They destroy books, furniture, and electrical appliances with their gnawing, urine, and droppings. House mice are linked to a number of human diseases including asthma and salmonellosis. House mice are difficult to control or exclude because of their tremendous breeding potential, wide range of food sources, and small size. House mice thrive under a variety of conditions and are found in and around homes and farms as well as in open fields and agricultural lands. They damage property and structures and transmit diseases such as swine dysentery and toxoplasmosis to livestock.

RECOGNIZING MOUSE INFESTATIONS

Droppings, fresh gnaw marks, and tracks indicate areas where mice are active. Nests made of finely shredded paper or other fibrous materials are often found in sheltered areas. Sounds of gnawing, squeaking, or climbing in walls, ceilings, or between floors, and a musky, ammonia-like smell are other signs of their presence. Although mostly active at night, house mice occasionally may be seen during the day.

The house mouse is a small rodent with relatively large ears and small black eyes. Mice are usually light gray with cream-colored bellies and weigh about ½ ounce. An adult mouse is about 5½ to 7½ inches long, including the 3-4 inch tail. The female mouse can have 5-10 litters of 5-6 young each in a single year. Young are born 19-21 days after mating and reach reproductive maturity in 6-10 weeks. The life span of a mouse is 9-12 months.

Although they prefer cereal grains, mice will eat almost anything. They feed sporadically and nibble bits of food here and there. Keen senses of hearing, smell, taste, and touch help them to avoid enemies. Mice can jump 12 inches off the floor to land on a flat surface. They are excellent climbers that can run up any rough vertical surface and travel horizontally along cables or ropes.

HOUSE MOUSE FACTS

- **Mice are difficult to exclude.** Their small size enables them to squeeze through openings slightly larger than ¼ inch in diameter.
- **Multiply quickly.** One pair of mice can produce more than 100,000 offspring in a year.
- **Prefer to stay close to the food supply.** Mice have a home range of 10-30 feet. Problems around homes are often related to food, water, and shelter for pets.

Photo: David Illig

HOUSE MOUSE CONTROL

Initial efforts should focus on sanitation, mouse-proof construction, and population control. For an existing infestation, some form of population reduction is almost always necessary. Rodent problems are not uncommon. Many businesses, homes, farms, and ranches have mice. At the first signs, it is important to act quickly to keep a few mice from becoming an infestation. Steps to control a house mouse infestation are shown on page 2.

Sanitation. House mouse control begins with proper sanitation, particularly the elimination of shelter. To survive, mice need places to hide, nest, and raise their young. It is almost impossible to eliminate mice through sanitation alone. They can survive in small spaces with very little food and shelter. Most buildings where food is stored or handled have mice, no matter how clean, unless they have been mouse-proofed. Look for evidence of mice activity in attics and suspended ceilings and below concrete slabs. Before cleaning, wet mouse droppings, urine, or nest materials thoroughly with a household disinfectant. Wear rubber gloves. Remove or store pet food, garbage, birdseed, and other food sources in secure containers. Clean up spills promptly, especially around bird feeders.

STEPS TO CONTROL A HOUSE MOUSE INFESTATION

Remove Food
- Clean up around pet food areas.
- Modify bird feeders to reduce spillage.
- Keep garbage cans and compost bins tightly closed.
- Pick up unwanted fruits and vegetables.

Remove Shelter
- Keep the garden area tidy.
- Mow lawn short.
- Seal homes, sheds, and outbuildings.
- Keep supplies and equipment at least 18 inches off the ground.

Consider rodenticides or trapping.
Use bait only if the presence of dead mice or odors will not be a problem. You can find traps and rodenticides at hardware or farm stores.

Be patient.
It might take up to 10 days to see results.

Still have a problem?
Call a licensed pest control operator.

Consider fumigation.
This should only be done by a licensed professional.

Consider costs and other factors when implementing a pest control program.

Remove cabinet clutter, recyclables, firewood, and compost piles that give mice places to hide and establish nests.

Rodent-proof construction. Mouse-proof construction is the most successful and permanent method of control. Exclude mice by eliminating openings larger than ¼ inch in diameter. Steel or copper wool can be used to plug gaps temporarily, but foundation cracks and openings for water pipes, vents, and utilities should be sealed with metal or concrete. Latex, plastic, rubber, spray foam, and wood are not suitable for permanent repairs because mice can chew through them. Doors, windows, and screens should fit tightly and be kept shut. Install metal edging if necessary to prevent gnawing.

Traps. Trapping is an effective method for controlling house mice. Although time consuming, it is the preferred method in homes, garages, and other structures when there are only a few mice. Trapping does not require hazardous rodenticides, and provides visible results. Dead mice can be removed, avoiding odors that can occur with poisoning in buildings.

Simple, inexpensive wooden snap traps are effective and lethal. They can be found at most hardware and grocery stores. Newer plastic traps were made to be set with one hand and to allow users to dispose of dead rodents without touching them. These traps can be loaded with a variety of baits, allowing the user to try several to figure out which ones their rodents prefer. Peanut butter, bacon, dried fruits, and seeds are popular because they are attractive to mice and easy to use. Commercial gel baits have been developed to appeal to rodents and remain effective for a long time. If baits are not well accepted, tie a cotton ball to the trigger to attract mice looking for nest material.

Triggers should be set lightly, so traps spring easily. Some traps are for use inside bait stations to keep dead mice out of public view. Live traps such as the Victor Tin Cat and the Ketch-All can catch several mice before resetting, saving labor. Rodents can be released from live traps or euthanized. Live traps are available in many hardware and feed stores.

Locate traps behind objects, in dark corners, and other areas where there are signs of mice activity. Place traps next to walls so mice pass directly over the trigger (below). Set traps on ledges and pallets in warehouses and buildings mice visit. Use enough traps to make the effort quick and decisive. Mice seldom venture far from food and shelter, so traps should be placed no more than 6-8 feet apart. As an alternative, glue boards can be placed along walls and pathways to catch and hold mice that try to cross. Do not place glue boards where

Trap placement for effective control.

children, livestock, pets, or desirable wildlife can come in contact with them. Glue boards lose effectiveness in dusty areas unless covered. Extreme temperatures also affect tackiness.

Rodenticides. Poison baits and fumigants are approved for house mouse control. Rodenticides may contain a wide variety of active ingredients, and prices vary depending on the formulation. Commercially prepared materials that do not require handling of concentrated materials are recommended. Soft baits, developed to be highly palatable to mice, have proven effective even where mice have access to an unrestricted food supply. Some poison baits kill mice after a single dose while others require multiple feedings (Table 1).

Single-dose rodenticides. Single-dose products are designed to reduce house mouse populations quickly and are indicated where mice are abundant or unwilling to accept bait because of competition from other food sources. These highly toxic rodenticides should only be applied by professional pest control operators or those familiar with their use. Bait acceptance can be increased by "prebaiting" with unpoisoned bait for several days before offering the rodenticide. If prebait is poorly accepted, it advisable to change the bait material or placement but the user should not apply the toxic bait. "Bait shyness" can occur with some single-dose rodenticides such as zinc phosphide, so it is best not to use them more than once a year in the same location. Remove and destroy all uneaten bait at the conclusion of the poisoning program. Never leave single-dose baits exposed more than 3-4 days.

Multiple-dose rodenticides. Multiple-dose products are generally safer than single-dose rodenticides. All except one of the multiple-use rodenticides listed in Table 1 are anticoagulants. Anticoagulants prevent blood from clotting, which damages capillaries and mice die from internal bleeding. The active ingredients are present in low levels, so bait shyness does not occur when using properly formulated baits. It may take several days for mice to consume a lethal dose. Fresh bait should be offered continuously for at least 2 weeks, or as long as mice are feeding. Some anticoagulants such as brodifacoum and bromadiolone can be lethal after a single dose even though mice do not die for several days.

Trade names have been used throughout this publication for simplicity, but this does not imply endorsement of named products or criticism of similar products not mentioned. At the time of publication, 118 products were registered in Kansas for house mouse control. Active ingredient percentages, trade names, bait formulations and lethal dosages of common rodenticides are shown in the table below.

Table 1. House mouse baits.

	Trade names	Formulations	Dosage required to kill
Non-anticoagulants			
Bromethalin (0.01%)	Black Flag, Cykill, Farnam, Just One Bite, Hy-End, Surekill, Tomcat, TopGun, Victor V	Loose pellets (bulk), place-packs, bait blocks, soft bait	Single dose; stop-feed action; kills warfarin-resistant rodents.
Cholecalciferol (0.075%)	Agrid3, D-Con XVI, D-Con XVII	Place packs (meal, pellets and canary seed), bait blocks	One-three feedings are lethal. Kills warfarin-resistant rodents. Kills anticoagulant-resistant rats and mice; reduces the risk of secondary poisoning; poses a low toxicity to birds.
Zinc Phosphide (2.0% baits)	Zinc Phosphide on Oats, ZP Oats, ZP Rodent Bait AG	Pellets, mixed grains	Single dose bait, quick kill results; some rodents may become bait shy to zinc phosphide.
Anticoagulants			
Brodifacoum (0.005%)	Final, Formus, Jaguar, Havoc	Loose pellets (bulk), bait blocks, place packs, soft bait	Single dose; kills warfarin-resistant rodents.
Bromadiolone (0.005%)	Contrac, Decimax, Hawk, JT Eaton Bait Block, Just One Bite, Hawk, Maki, Resolv, Revolver, SureKill, Wilco	Loose pellets (bulk), bait blocks, place packs, soft bait	Single dose; kills warfarin-resistant rodents.
Chlorophacinone (0.2%)	Rozol Tracking Powder	Tracking powder, paraffinized pellets	Multiple feedings; restricted use in outdoor areas.
Chlorophacinone (0.005%)	BorderLine	Pellets	Multiple feedings; restricted use in outdoor areas.
Difethialone (0.0025%)	First Strike, Final, Generation, Hombre, FastDraw, Ramik, Tomcat	Pellets, bait packs, mini-blocks, soft bait	Single dose; kills warfarin-resistant rodents.
Diphacinone (0.005%)	Ramik, Rodentex, Surekill, Tomcat, Victor V	Pellets, bait packs, bait blocks	May cause death in rats occasionally after only one feeding, but 2-4 multiple feedings are usually required. Mixes in water, useful in dry conditions.
Diphacinone sodium salt (0.106%)	Liqua-Tox II, Tomcat Liquid	Liquid	
Warfarin (0.025%)	Ferret, Contrax, Kaput Mouse Blocks	Bulk pails, place packs, 50 lb. bulk	Must be ingested in repeated doses over 4-10 days for rats, sometimes longer for mice. Genetic resistance developed in some locations.

BAIT SELECTION AND PLACEMENT

Anticoagulant grain baits or pellets can be purchased in bulk or in small paper or plastic packets for placement in burrows, walls, and other locations. "Place pack" baits stay fresh, so mice readily gnaw into the packets to consume the baits. Anticoagulants are also combined with paraffin wax and formed into blocks. Bait blocks work well in sewers, gutters, and other damp locations where loose grain baits tend to spoil quickly but are not as readily accepted as other baits. Anticoagulant baits are available as sodium salts that mix easily with water. Mice do not need much water, but liquid baits can be effective when water is scarce and mice are feeding on dry grain or livestock feed. Water baits should supplement other control measures.

Bait placement. Place baits in areas where there is evidence of mice activity and no more than 10 feet apart. Baits should be placed inside walls if mice are living in wall spaces. A bait station is strongly recommended for any toxic bait application. The bait station shelters rodenticides from the weather and improves safety for people, pets, and other animals. Choose a bait station that is durable, compact, and easy to clean. Look for one with vertical or horizontal rods to keep rodenticides in place that can hold several mice at a time. The bait station should have two openings about 1 inch in diameter with a straight, visible path between them. Place the bait box next to the wall with the opening parallel to it, adding a warning label as a precaution. Establish bait stations in and around the building perimeter where it is impossible to exclude rodents. Offer fresh bait continuously to control invaders before breeding populations become established. Bait stations may have to be anchored or glued to paving blocks to keep children, pets, or wildlife from disturbing them.

FUMIGANTS

Structures, railway cars, and other enclosed areas occasionally may need to be treated with fumigants or poison gases. Most fumigants registered for house mouse control contain aluminum phosphide, although some contain methyl bromide, sulfuryl fluoride, or carbon dioxide. Fumigants used for insect control can kill house mice incidentally. Both mothballs and ammonia release fumes but have not been proven effective or registered for mouse control. Fumigation quickly achieves 100 percent rodent control but can be expensive, especially if the building has to be tarped to contain the fumigant. Fumigation is extremely hazardous and should be used only as a last resort.

CAUTION: Fumigants are highly toxic to humans and other animals and should not be used in situations where building occupants can be exposed to the gases. Fumigants are restricted use pesticides, which are approved for use only by licensed pest control operators in enclosed structures. **The use of any fumigant for wildlife control, including mice, requires a permit from the Kansas Department of Wildlife, Parks, and Tourism.** Visit your local K-State Research and Extension office to complete an application.

SAFETY PRECAUTIONS

- Follow recommendations and general safety precautions on the product label. Place baits so they are only accessible to rodents. All rodenticides are hazardous to humans, livestock, pets, and nontarget animals, and they can be deadly.
- Use ready-to-use baits to reduce the risks involved in handling concentrated toxicants. Label bait containers and stations with appropriate warnings. Store unused bait, concentrates, and fumigants in a locked cabinet out of reach of children and animals.
- Pick up dead mice after poisoning. Use rubber gloves or tongs and dispose of mice by burial or incineration. If there are only a few, place them in a plastic bag, close it tightly, and dispose of the bag with the household garbage.

Electronic devices. Mice are easily frightened by strange or unfamiliar noises but quickly become accustomed to repeated sounds. Ultrasonic sounds out of hearing range are of limited use in rodent control. Sound from these devices does not penetrate objects. It is directional and loses intensity quickly with distance. There is little evidence that electronic, sound, magnetic, or vibrational devices can drive established mice or rat populations from buildings or provide adequate control.

Predators. Cats, dogs, and other predators kill mice but do not provide effective control. Mice often live in close association with dogs and cats. Problems around the home are often related to food, water, and shelter provided for pets. The best strategy for controlling mice is to keep them out in the first place. Keep your home and property uncluttered. Inspect your home yearly to make sure it is mouse-proof. Do not expect your cat or dog to keep mice away. Take the necessary steps to prevent a few mice from becoming an infestation.

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Revised from original by F. Robert Henderson, former Extension Wildlife Specialist.

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