

This presentation focuses on controlling rodents.

Outline

- What rodents are
- What they eat
- Where they live
- How to think like a rodent
- Prevention and control

Also known as...
ratones y ratas



This is the outline of the rodent presentation.

Rodents are health hazards

- Carry infectious diseases
- May cause asthma attacks
- Bite
- Damage food and property
- Can attract other pests
- Are repulsive



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Rats and mice carry various infectious diseases, including *Salmonella* and Lymphocytic Choriomeningitis (LCMV) a serious disease for pregnant women. *Mice leave little drops of urine wherever they go.* Mouse urine can trigger asthma attacks in sensitive people.

Rats may bite people when threatened. Babies are especially at risk since the rat may be in the crib with them, feeding on spilled milk.

Both rats and mice instinctively gnaw on things. This is damaging to property and can be dangerous if gnawing results in wires sparking and starting a fire.

What is a rodent?

A few types of rodents

- Rats
- Mice
- Squirrels
- Chipmunks
- Woodchucks

What is a rodent?

Rodents are gnawing animals.
They

- gnaw to wear down their teeth and get where they want to go (can cut anything softer than steel);
- are most active at night;
- make lots of babies fast;
- travel the same paths nightly, staying close to walls.



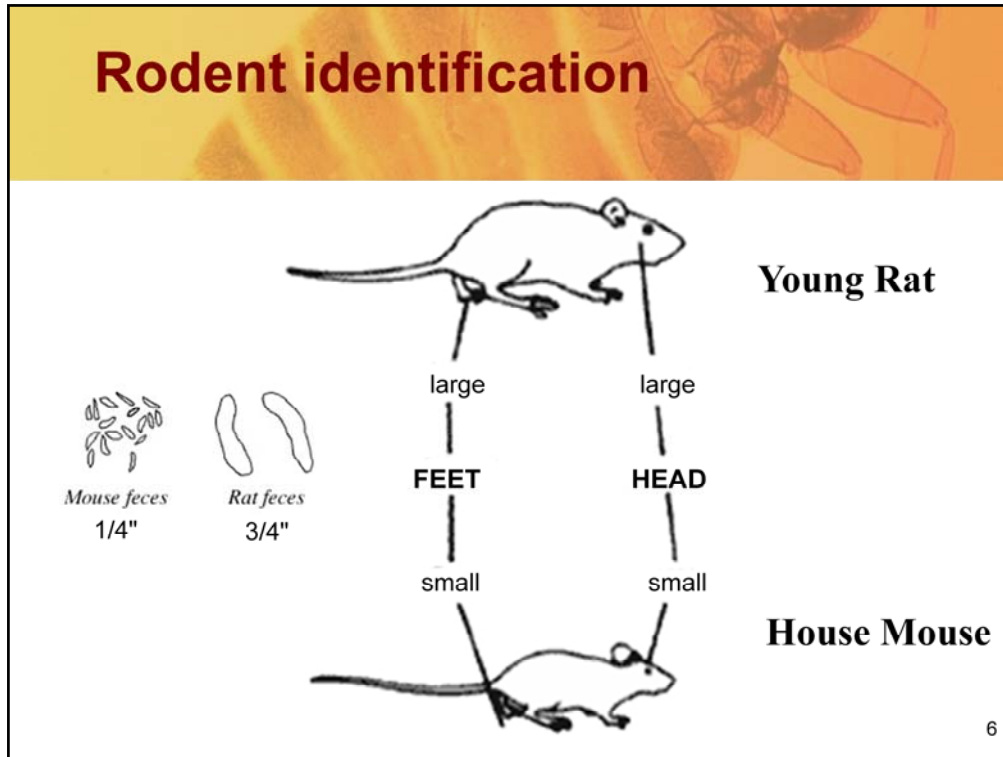
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Rodents are gnawing animals. They gnaw wood, wires, and other rough materials. The term "rodent" comes from "rodentia"—gnawing animals. *Rodents are some of the most successful mammals (success in this case means living long enough to produce offspring). They are a formidable opponent.*

Understanding rodent behavior is the key to controlling them. Knowing that they are active at night and are good reproducers is important (rodent problems must be acted upon quickly).

Trainees may have stories about rodents' gnawing abilities (concrete, trash cans, cupboards, wires). Despite the myth, rodents are not likely to start gnawing on a smooth surface. This is why good repairs (no cracks, bumps, or uneven edges that promote gnawing) are essential to rodent control and can have an impact.

Suggestion: Have the trainees share some stories and lead into a brief discussion/ review of exclusion. The conclusion should be that anything used to exclude rodents should be able to hold up to and not encourage their gnawing. Since they are persistent, it is best to trap (and kill) the rodents and make repairs.



The droppings (feces) of mice differ from those of rats. Knowing the difference can help determine if the pest in question is a mouse or rat. Control of each will differ. *Droppings can help trainees find nests or burrows because they are left in areas of high activity. Rodents communicate by smelling chemicals in droppings.*

Adults can be distinguished by size, but it can be difficult to tell an adult mouse from a baby rat. The feet and head of mice seem in proportion to their bodies and their tails are thin and long, while the rats have hind feet and heads that seem larger than they should be and thick tails that are shorter than their bodies. *Mice are not small rats and mice do not become rats when they go outdoors.*

Rats

- Will travel 100 feet from their nest
- Usually live outside and come inside for food and water



Norway rat burrow

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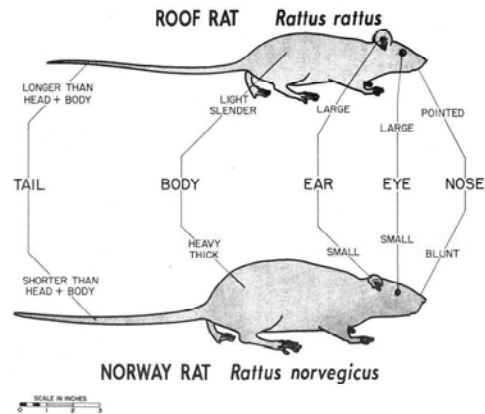
Because it is a constant battle to exclude rodents, it is best to exclude and trap at the same time.

Rats love to burrow, usually outdoors, and prefer to live in secluded areas. If there is plenty of food available, however, they will burrow and nest inside buildings. Rats will travel further than mice for sustenance, but still prefer to stay within 100 feet of their burrow if possible. *Unlike mice, rats need to drink water daily.*

Action should be taken when evidence of even one rat is seen.

Rodent identification

- Roof rats nest up high.
 - Occur in southern states and along the west coast.
- Norway rats burrow in the ground.
 - Occur throughout the U.S.



Identifying rodents correctly is essential for determining where to make repairs and place bait.

Rats

- Need a hole the size of a quarter to enter



- Are very smart, cautious, and afraid of new things
- Need water every day

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Rats can squeeze through a $\frac{1}{2}$ " gap, such as under a door. A quarter can be used for a visual to remember the size hole a rat can use to enter buildings.

Mice


- Breed rapidly
 - A single pair can become an infestation quickly!
 - Take action when evidence of ONE mouse is seen or heard.
- Don't travel far—just 30 feet from their nest



One day old mouse pups

Mice

- Mice need a hole the size of a dime to enter.



The image shows a wooden ruler with markings in inches. A US dime coin is placed on the ruler for scale. The ruler shows markings for 1 and 2 inches. The dime is positioned between the 1 and 2 inch marks, illustrating its size.

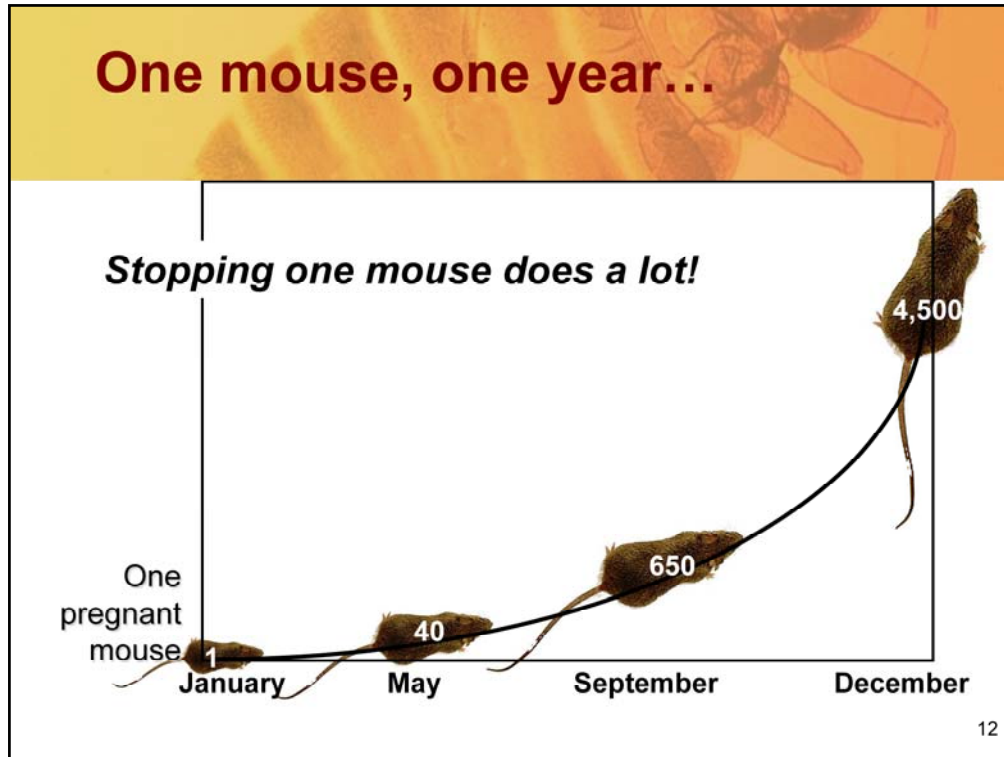
- Mice are curious
- Don't need to drink water daily

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Young or small mice can fit through a gap as narrow as $\frac{1}{4}$ " and a hole the size of a dime.

Have trainees grab a pen or a pencil and look at the blunt/ eraser end. This is the size of the gap that a mouse could fit through. Contrary to popular myth, mice and rats do have bones, but they are very flexible. If they can get their head through a hole, they can push the rest of their body through. Have trainees look around the room or think of areas where they spend time at the PHA. How many exterior doors could you shove a pencil under?

Ask: What else could fit through a hole this size? Answer: Cockroach. Note that the exclusion methods used for rodents will often work for cockroaches, too!



Mice can mate when they are one month old. The gestation period is 19 days. There are 4–7 young per litter, eight litters per year, 30–35 young weaned per female per year....This growth rate is the same as that of cockroaches!

This graph assumes six litters of six per year, 50% female in each litter, and all survive. This is not realistic (all will never survive), but it is a vivid picture that one mouse will build a large family very quickly.

Signs of rodents

- Sightings
- Noise
- Gnaw marks
- Nests
- Rat burrows
- Droppings
- Holes and rub marks
- Indicator pests

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Mice and especially rats, are more difficult to spot in the building than cockroaches. To inspect, trainees must know to look for evidence of their presence.

You have already touched on live rodents. *With this slide, discuss noise, gnaw marks, nests, and burrows.* The next three slides will cover droppings, holes and rub marks, and indicator pests.

Droppings and urine stains



Rodent urine stain in drop ceiling



Mouse droppings by a power strip

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Droppings are the most distinctive evidence of rodents. This photo shows mouse droppings next to a power strip on a desk. Pointed feces usually indicates a rodent. Mouse feces are about the size of fat ice cream sprinkles; rat droppings are larger—about the size of olive pits. The urine often smells.

Holes and rub marks



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Rodents are active mostly at night and do not have fantastic eyesight. They get around by feeling with their whiskers and keeping the sides of their bodies in contact with a wall. They memorize paths.

Note the rub marks along the wall in the lower picture.

Have trainees guess what kind of rodent made these marks. Answer is a roof rat: up high.

Suggestion: If students need a stretch break, have them navigate the room like a rodent...trying to keep their shoulders in contact with a wall at all times.

Indicator Pests

Found near dead animals or trash		
	Blow Fly	Hide Beetle
Found near grain or bait stored in walls		
	Indian Meal Moth	Grain Beetle

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Other pests might help to identify a rodent infestation. Rodent bait is made of high-quality grains (so the rodents will eat it) and if it is left in walls, grain pests will live off of it. Insects don't have blood, so the anticoagulants in rodent bait that make rodents bleed internally do not harm insects.

Shiny blue or green flies are evidence of old trash or dead animals (they lay their eggs in the rotting stuff).

Hairy beetle larvae (hide beetles) feed on dried carcasses or dead insects.

Indian Meal Moths are a common pest of stored products. Either there is infested grain in the cupboards or the moth larvae are feeding from the grain that mice have brought into their nests.

Other beetles will also feed on stored grain, but must be properly identified to be useful indicators.

What rodents eat and drink

Rodents eat

- Human and animal food available in the area

Rodents drink

- Rats drink water
- Mice can get the water they need from their food

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Limiting rodents' access to food is critical, and their feeding behavior (where/when they are feeding) needs to be remembered when setting traps.

Rats can go 3–4 days without food, but only 1–2 days without water. They eat 3–5 ounces per day (a soda is 12 ounces, so a little less than the weight of a half-full soda can). They prefer to stick to a few feeding locations and eat 2 meals a day.

Mice can go a month without drinking...they get most of their water from food. They like to nibble many times during the night. They need less than an ounce of food per day.

The main point of rodent food: Rodents have similar nutritional requirements to humans and, like us, prefer fresh food. Knowing what a particular rodent is eating tells you what to use for bait on a trap.

Where rodents live

- Rats: Outside, but will come in if the place is hospitable.
- Mice: Nest in walls, stored fabric, cars, boxes, or the ceiling.



Rat burrow by a wall



Mouse nest in a hat

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Rodents will often nest near a heat source.

Norway rat burrows are usually 1–3 feet deep and have at least two entrances. The main hole (2–4" across) and one or more bolt-holes (three or more feet from the main entrance and may be small and well camouflaged). Burrows are often found under plantings and groundcover; near trash areas or outdoor trash cans; and under concrete slabs, tires, sheets of plywood, or other debris on the ground. Outdoor vending machines and other food sources are also popular places for Norway rats to be found. *Eliminating debris and trash is a crucial part of control. Doing so will make new burrows easier to spot and discourage rats from setting up shop.*

Roof rats prefer to nest in secluded areas above ground in such places as attics, soffits, overhead garage storage, in the vine cover of fences or buildings, and in wood piles or other stored materials where harborage can be found. They favor dense non-deciduous trees or trees with hollow cavities and the crowns of palm trees, especially when old fronds are not removed. Roof rats sometimes burrow in the ground, especially in hot, dry environments. In these areas, they may use trees, materials stored on the ground, concrete slabs, and sidewalks to support shallow burrows. Because they are often living overhead between floors or above false ceilings, there is less chance signs of roof rat tracks, urine, and droppings will be seen.

Mice will nest in insulation, old clothes, cars, boxes, shoes...many things. *They live and eat in a 10 square foot area, so if there is food available they will nest.*

Got rodents? Now what?

- There is not a single answer.
- First find out:
 - Rat or mouse?
 - How many?
 - Where?
- Then use solutions that provide:
 - Most effective prevention and control
 - Compatibility with people, pets, and other control measures

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This is what makes IPM different—control methods are tailored to the situation, using information to make the best decisions about control tactics.

What is it? Rats will usually require outdoor exclusion whereas mice will usually require work within units.

How many? A heavy infestation can be knocked down with sanitation, exclusion and many traps and bait in tamper-resistant stations, but this degree of control may be unnecessary if there are only a few.

Where? Any evidence of mice means they are probably nesting within 10 feet. Evidence of rats will require an exterior walk (which will be practiced) to look for burrows.

Recordkeeping in a single building log will help make sure everyone's observations are noted and followed up on.

Write in the IPM log

- Find out:
 - Rat or mouse?
 - How many?
 - Where?
- Record:
 - Date
 - Detailed observations
 - Action taken



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Trainees need to positively identify a rat or mouse infestation so they can focus their inspection, monitoring, and control efforts.

Use this slide for review: the upper photo is a rat; the lower photo is a mouse.

Prevention and control: Dumpsters

- Dumpsters should be
 - free of holes
 - covered
 - placed on cement
- Screen drain holes
- Empty dumpsters regularly; they should never overflow



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The dumpster on the left needs to be switched for one without rust. The dumpster pictured on the right should be further from the building, covered, on a concrete pad, and larger so that it doesn't overflow (or it should be emptied more often).

Prevention and control: Sanitation

Eliminate harborage, food, and water



Clutter in a corner



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Proper housekeeping (inside and out) is essential to rodent control.

The piles pictured are perfect harborage—that is, hiding space—for mice. And the cardboard boxes could also be harborage for cockroaches who love the spaces created by the edge of the boxes, and the paper and glue, which they can eat. These kinds of mess should be cleaned out. Get rid of cardboard and neatly store other items on shelving at least 6 inches off the floor and preferably 6" away from walls. 6" is not high enough to keep mice (much less rats!) from climbing up, but it does make inspection and trapping possible.

Reference: Preventing Rats on Your Property, pp 4–6.

Prevention and control: Exclusion

For a hole, crack, or gap...



Stuff it



Seal it



Check it often

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Stuffing holes with copper mesh discourages rodents from gnawing through repairs and is essential for gaps caulk could not bridge. (Stainless steel may also be used, but avoid regular "steel wool," which will rust and deteriorate over time). Then seal over the mesh with caulk, putty, or spackle to deter rodents and cockroaches. The photo on the right shows a completed repair.

Reference Preventing Rats on Your Property pages 7–10.

Prevention and control: Traps

- Effective and reusable
- More ARE better
- Check often
- Placement is key**



Trap jumped from the wall when it snapped.

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Traps come in several forms, demonstrate traps and pass them around.

- Snap traps. Cheap, easy, and effective. The newer style is much easier to set, clean, and empty the rodent. These traps work like binder clips.
- Glue traps. Cheap and easy, but the rodent takes a long time to die and makes noises that can be disturbing to residents. Adult mice and rats will usually avoid glue traps. They can be made more effective by using box-style traps or putting the glue board inside short sections of PVC pipe; mice prefer tunnels and dark areas, and will not detect the glue boards until they cannot get away.
- Curiosity traps. Can be very effective. They come in many styles, but you must check them often and may be left with a live animal that needs to die.
- Electronic traps. Expensive. Electrocutes a mouse with a small electrical charge. One can dump out the mouse without touching it.
- Live traps are available but not recommended. What does one do with the mouse once it is caught? Or an angry rat?
- Ultrasonic devices. Have not been shown to be effective.

Baits could be: fabric, dental floss, food...rodent populations will have preferences for the food that is normally available to them (e.g. rats next to a restaurant that throws away a lot of chicken will prefer chicken).

Reference: Preventing Rats on Your Property, pp 11–12.

Trap placement is key

Place the trap against the wall where rodents travel. (The edge of the trap must touch the wall.)



Trap set correctly so it snaps towards the wall

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Always place snap traps against walls, ideally in corners, or in known runways. Traps may be doubled up, and the more traps used the more effective they will be.

The reason for this placement is twofold:

- 1. Rodents are likely to travel the same paths along walls every night. Setting traps where they already travel increases the chance of one running over the trap.*
- 2. Rodents get a lot of information from their hairs and have a very fast response time. If a trap is along a wall, the wall blocks them from reacting to the trap closing by running out to the side.*

How to trap rodents

Bait with what they're eating or using to nest.

Mice

1. Bait & set many traps
6 traps for each mouse
At least 3' apart
Set immediately

Rats

1. Place many traps
2. Bait and leave UNSET until rats are readily feeding
3. Bait and set all traps

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An alternative for quicker (in one night) rat trapping is to place three traps next to each other, bait across all three, and set only the middle one.

Rats are sometimes difficult to catch with traps. Rats will want to become familiar with the trap before getting on it.

Leave traps baited but unset for several days, so the rats get used to feeding from them. Then rebait and set all the traps at once.

Traps are very effective for mice. They take advantage of their curiosity. Mice will be trapped easily the first night, but then they will be trap shy. Set many traps the first night; clear them in the morning, and remove. Set them again a week later, in slightly different locations. This technique will overcome trap-shyness.

**Prevention and control:
Targeted chemical use**

- The label is the law.
- All rodenticide labels require tamper-resistant stations.
- Read the label on both the station and the bait.
- The bait station should be secured, locked, and labeled.
- If the rodents are inside, consider using traps.



An opened bait station

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Rodenticides can be dangerous to non target mammals. Many make rodents bleed internally. Some are designed to kill after a week, but it takes only a little bit to kill them. It is important to know where all bait is placed and to check it often to make sure no pets or children are able to get to it.

For reference, the recent changes to EPA regulations on rodenticides:
Consumer size products (products containing less than or equal to 1 pound of bait)
May not contain brodifacoum, difethialone, bromadiolone, or difenacoum (the second-generation anticoagulants).
Loose bait forms such as pellets are prohibited.
Each retail unit must include a pre-loaded bait station.
Bait refills may be sold with pre-loaded bait stations in a single retail unit.

Second-generation anticoagulant products for use around agricultural buildings
Products must contain at least eight pounds of bait.
Bait stations are required for all outdoor, above-ground placements of second-generation anticoagulant products.
Bait stations are required indoors if exposure to children, pets, or non target animals is possible.
Product labels must indicate that the product is for use only in and around agricultural buildings and that use in residential use sites is prohibited.
Distribution to and sales in "consumer" stores including grocery stores, drug stores, hardware stores, and club stores will be prohibited.

Second-generation anticoagulant products for professional applicators
Products must contain at least 16 pounds of bait.
Bait stations are required for all outdoor, above-ground placements of second-generation anticoagulants.
Bait stations are required indoors if exposure to children, pets, or non target animals is possible.
Distribution to and sales in "consumer" stores, including grocery stores, drug stores, hardware stores, club stores, will be prohibited.

Don't present a bias. Give trainees the facts about the regulations and let them discuss and draw conclusions for themselves.

References at <http://www.epa.gov/oppsrrd1/reregistration/rodenticides/>

