

CONTROLLING VERTEBRATE DAMAGE

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brown rats

(*Rattus norvegicus*)

Norway, sewer, common, house, and wharf rats

See also the first in this series: Extension Bulletin E-860 on "General Considerations."

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RATS CAN CONSUME and contaminate food, destroy property and spread disease. They are dependant upon man for food and shelter. **Therefore, no population reduction technique can be effective unless food and shelter are first eliminated by good sanitation and rodent-proofing.** Rats leave greasy smear marks along the edges against which they brush, oblong droppings ¼ in. long or longer, gnaw marks on surfaces, spilled or partially eaten food, and burrows about 2 in. in diameter or larger. Young rats can be distinguished from mice by their blunt tail and smaller ears.

HABITAT ALTERATION

Sanitation

—Eliminate all accumulations of trash, debris, etc. inside and out. Clean up all spilled food and litter as soon as possible, but at least once daily.

—Store all materials, lumber, boxes, pipe, etc. on stands at least 18 in. above the ground or floor and 1 ft. away from the walls.

—Store food and feed in metal rodent-proof containers, if possible. Otherwise store on stands at least 18 in. above the floor. Keep all food containers tightly closed.

—Set equipment, appliances, cabinets, etc. flush against the wall or out far enough to allow cleaning behind them.

—Use metal garbage cans with tight-fitting lids.

EXCLUSION

Rodent Proofing

—Close all openings ½ in. in diameter or larger with cement, sheet metal or screening.

—Cover all edges of doors, window sashes, etc. with sheet metal or hard-

ware cloth to prevent gnawing and subsequent entry.

—Extend rodent proofing to a height of 36 in. above the ground or 12 in. above the level of piled materials.

—Where utilities enter concrete, stuff steel wool or hardware cloth in hole and fill with concrete. Where utilities enter wood, fit sheet metal tightly around utility.

—To rodent-proof an isolated structure such as feed storage sheds or corn cribs, attach a skirt of ¼ in. wire mesh at least 3 ft. wide to the structure. Bury the bottom edge 12 in. in the ground and cover the top edge with an 8-in. wide strip of sheet metal and fasten to the structure. Treat doors and windows as suggested above. Attached structures, such as feed storage rooms, will have to be completely lined with hardware cloth.

—Concrete foundations should extend at least 12 in. above the ground and 18 in. below ground to prevent gnawing and subsequent entry. Foundations less than 18 in. deep will require an L-shaped curtain extending outward from the foundation to prevent burrowing beneath the foundation.

—Keep floor drains tightly covered with metal grill work to stop entry from sewers.

OTHER HOME TECHNIQUES

Trapping

The most effective, versatile and inexpensive rat traps are the rat-size, wooden-base snap traps, available in many stores. Always use several traps, but if rats are numerous, *many* traps are necessary. Some excellent baits are cheese, raisins, nut meats, fresh crisp fried bacon, and a peanut butter-oatmeal mixture.

Snap traps can be made more effective by enlarging the trigger or bait pan with a square of thin, stiff cardboard cut slightly smaller than the snapwire. Smear the cardboard with peanut butter

for bait. Place traps where rats are seen, heard and most likely to run: along walls, under appliances and cabinets and, if necessary, along rafters and pipes. Set traps perpendicular to rat travel routes. Use obstacles to force rats over the enlarged triggers of traps. If many traps are used at once, the rats can usually be eliminated before they become trap-shy.

Poisoning

Multiple dose poisons—Rats must consume several doses over several days before dying. Single doses of these poisons rarely kill, unless very large. However, pets should be well fed and prevented from eating poison bait or poisoned rats. These poisons are diphacinone, fumarin, pival, warfarin, chlorophacinone, PMP, and prolin.

Single dose poisons—One dose of red squill will kill rats but is relatively safe because it is unlikely to kill anything but rats.

RH-787 is a new slow acting poison for rats and mice. It is available commercially in a 2.0% bait. Although poisonous to all vertebrates, it is more toxic to rats and mice, and has little secondary hazard.

Food baits for use with multiple dose poisons—Many commercial poison baits are available or may be homemade. Any bait should be fresh, not readily perishable, and more attractive than any food already available to rats. Some excellent baits are cornmeal, grits, bread crumbs, and rolled oats. Mixtures of these materials, plus sugar, increase attractiveness. Kitchen grease, peanut oil, and fish oil also help, but may cause the bait to spoil faster. Formulations for homemade poison baits are given on page 2.

Water baits for use with multiple dose poisons—Water containing a multiple dose poison may be an effective poison bait if no other water sources are available to rats. Commercial preparations are available or may be homemade. Such baits must be exposed in non-metal

1. Formulations for Homemade Multiple-Dose Poison Food Baits

Poison	Concentration	Amount in bait
warfarin	0.05 %	0.5 % by weight
diphacinone	0.1 %	0.05 % by weight
pival	0.5 %	0.05 % by weight
fumarin	0.5 %	0.05 % by weight
Chlorophacinone	0.28 % solution	1 pt. of solution with 50 lb.
prolin	0.05 %	0.5 % by weight
PMP	1.1 %	0.05 % by weight

2. Formulations for Multiple-Dose Poison Water Baits

Poison	Concentration	Amount used
sodium salt of diphacinone	0.106 %	1 ¼ level Ts. per qt. water
	1.25 % (tablet)	1 qt. water
fumasol	0.14 %	1.5 oz. per qt. water
	0.5 %	1 Ts. per qt. water
	1.2 %	5 grams per qt. water
pivalyn	0.14 %	1.5 oz. per qt. water
	0.3 %	1 lb. per 4 gal. water
	1.5 %	4 grams per qt. water

3. Formulations for Single-Dose Poison Food Baits

Poison	Concentration	Amount Used in Bait
red squill	3.5 %	2.8 % by weight

4. Formulations for Single-Dose Poison Food Baits

Poison	Concentration	Amount used in bait
antu	21-25 % (dust)	1 oz. per 10-15 oz.
zinc phosphide	94 %	1 oz. per 6 lb.

containers or water fonts such as those used for chicks. Formulations are as shown above.

Food baits for use with single-dose poisons—Commercial poison baits are available in some stores or from professional pest control companies. Homemade poison baits similar to those described for multiple-dose poisons are suitable, but ground meat or fish can also be used. Formulate as shown in the chart above.

Use of poison baits—Multiple dose poison food baits should be placed in 4- to 16- oz. quantities wherever evidence of rats is seen, but where children and domestic animals cannot reach them and where there is no danger of contaminating food or feed. If necessary, use bait stations. A bait station is a box with entrance holes large enough for rats, a tamper-proof lid secured by latch and fastened securely to the site. Label box **POISON**. Check all poisoned baits daily and replenish or replace if moldy or rancid. Replace water baits if cloudy. Continue baiting for at least 10 days or until bait consumption ceases. Try alternate locations if no bait is consumed. Dispose of all dead rats. Confine pets and feed them especially well during poisoning operations.

Single-dose poison baits should be placed in tablespoon quantities wherever evidence of rats is seen, especially down burrows, but where children and domestic animals cannot reach them and there is no danger of contaminating

food or feed. If necessary, use bait stations as described earlier. Red squill poison baits will be more effective if prebaiting with unpoisoned bait is done for 3 days. Replace missing baits often the first day and collect all uneaten baits after 3 days. Dispose of all dead rats.

Odors—To prevent putrefaction odors dead rats must be removed. Special deodorants available from pest control companies and industrial or chemical supply firms will help control odors.

Dogs and cats—Dogs, especially terriers, may help control rats if sanitation is good and the dog is not overfed. An exceptional cat may be effective, but adult rats are too formidable for most cats.

OTHER BUILDINGS AND AREAS

Poisoning

Multiple dose poisons—Multiple dose poisoning techniques in the home are also applicable to other areas. Commercial multiple poison bait formulations also are available for special uses, especially in exposed situations such as sewers, burrows, etc.

Single dose poisons—The best population reduction technique for rats in areas where food is abundant, such as feedlots, is the use of single dose poisons in fresh meaty baits, safety permitting. Consult Home Techniques for information on red squill and RH-787.

Two additional single dose poisons are antu and zinc phosphide. Both are very toxic and demand special caution.

Both are available commercially in poison bait form, and antu is available commercially in concentrate form. Zinc phosphide concentrate is available from the U.S. Fish and Wildlife Service for use under government supervision. (See Sources of Supply, U.S. Fish and Wildlife Services.)

Food baits for use with single-dose poisons—If grain baits are suitable, the commercial poison baits can be used. Fresh baits made of diced apples, sweet potatoes, ground meat, or fish must be homemade. Formulations are given in the chart (No. 4).

Mix toxicants directly with bait and stir until thoroughly mixed. Use immediately. Do not breath dust. Wash hands, face and all utensils after use.

Use of single-dose poison baits—Place tablespoon quantities wherever evidence of rats is seen, but where children and domestic animals cannot reach them and there is no danger of contaminating food or feed. If necessary, use bait stations (see Home Techniques). Dispose of all dead rats and uneaten baits at completion of project. Pets and livestock must be prevented from eating dead rats. Do not repeat antu treatment within 6 months of initial applications.

Tracking powders—The following rodenticides can be applied as a dust so that rats walking through the powder will pick up enough poison to kill them:

- antu - 20-25 %
- chlorophacinone - 0.2 %
- PMP - 2.18 %

Dust tracking powder into holes and travel routes. Use obstacles to force rats through treated areas. Keep powder in treated areas for at least 20 days. Do not place powders in locations accessible to children, domestic animals or wildlife, or where the wind may disperse it. Use only where no powder will come into contact with food or feed. After completion of control program, clean up powder and dispose of all dead rats. Do not repeat antu treatment within 6 months.

Poison gases—Certain gases are effective fumigants for rats. One of the less hazardous fumigants is chloropicrin, available in 15%, 85% and 99% concentrations. The kind of area to be fumigated and its size determine the concentration and amount to be used. Specific directions are on the label. In general, the area to be fumigated must be made air-tight. The liquid concentrate can then be piped into the area or poured onto crumpled absorbent material that serves as a wick. Wear safety masks. After fumigation is completed, air out area for several hours before use. Persons unfamiliar with fumigants, especially the more hazardous ones, should obtain professional assistance.