

## **Control Commensal Rodents In Poultry Houses**

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**This publication is primarily for poultry farmers and service persons trying to control rats and mice in poultry houses. However, much of the information may also be applied in controlling rats and mice in other poultry facilities. The following topics are discussed:**

- **Rodent Traits**
- **Diseases Spread by Rodents**
- **Controlling Rodent Populations**
- **Bait Preferences and Care**
- **Selecting and Mixing Baits**
- **Quick-Kill Poisons**
- **Anticoagulant Poisons**
- **Covered Bait Stations**
- **Rodenticides**

**You can have good rat and mouse control by using properly selected rodenticides and baits. Once you select and properly mix the bait, proper placement and care to keep the bait fresh and clean are important.**

**A good rat and mouse control program requires some effort and expense, especially at first. Many poultry farmers will be willing to spend the time and money to begin and maintain good control, while others will not.**

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### **Commensal Rodents**

**Rats make up the largest single group of mammals on earth—one-third of the earth's total mammal population.**

**Several kinds of rats and mice are found in Mississippi. However, only the Norway rat, the roof rat, and the house mouse are considered important pests around farms and homes. They are referred to as "commensal rodents" because of their intimate relationships with humans.**

### **The Norway Rat**

The Norway rat is slightly larger than the roof rat and is primarily a burrowing animal but can climb when necessary. It prefers to live in a burrow 8 to 18 inches below ground. It is sometimes called the sewer rat, house rat, wharf rat, or barn rat.

### **The Roof Rat**

The roof rat is a good climber and seldom burrows in the ground. It lives above ground in attics, between walls, in cabinets and shelves, and in barn lofts. The roof rat, compared to the Norway rat, has a more slender, streamlined body, more pointed nose, ears and eyes, and its tail is longer than its body.

Other than the differences listed, the Norway and roof rats are similar. Both are good swimmers; because their front incisor teeth grow an average of 5 inches a year, they gnaw almost constantly to keep them worn down. They can fall 50 feet without serious harm. They usually feed twice at night—just after dark and just before dawn. They usually stay within a 100-foot radius if food and water are available but have been known to move almost a mile a day in search of plentiful water and shelter. Adult rats eat about 1 ounce of food and 1.5 ounces of water per day. Without food, weakness begins after about three days, but without water, weakness begins in one or two days. When weakness begins from lack of food or water, they begin to move elsewhere. Overpopulation also causes some rats to seek new locations.

### **Reproduction of Rats**

Rats breed at three to four months of age and probable continue until about 18 months old. Gestation is 21 to 25 days. The young are weaned at three weeks old, often just before the arrival of another litter. A female can breed only one day after giving birth. If fertilization does not occur, she will come into heat about every five days. A female averages six litters per year, with nine young per litter. However, under ideal conditions, litters may contain 20 young, and 14 litters have been recorded during one year. The babies from one pair of rats would be more than 3.5 million in three years under ideal conditions and ignoring the death rate. In natural conditions, however, many die, but in a year, as many as 60 to 70 offspring from one female may mature. Breeding is greatest in spring and fall, drops some in summer, and drops substantially in winter.

### **The House Mouse**

The common house mouse depends less on humans than rats do. It commonly inhabits grassy fields and cultivated grain crops and adapts well to living away from humans. For example, some have been captured on open tundra in Alaska, miles away from human settlements. On the other hand, they adapt well to living with humans, as indicated by a report of their living 1,800 feet below ground in a coal mine, probably feeding on lunch scraps of the miners.

The house mouse has a small range. Home range tends to be from a few feet up to 25 feet. This is important to know when determining the frequency and distance to place poison bait or traps. Mice, unlike rats, show almost no fear of new objects placed in their ranges.

Rats and mice have poor vision. Rats see clearly only up to about 2 feet and mice even less-6 inches. However, they can detect movement beyond their clear-vision range. Their activity patterns are based on their keen senses of smell, taste, hearing, and touch.

### Reproduction of the House Mouse

Reproduction of the house mouse is similar to rats. The average gestation is 20 days, and litter size is about six, with six to ten litters per breeding life of the female.

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## Diseases Rats and Mice Spread

Rats are known to spread 35 diseases to humans and animals. Some human diseases rats spread are salmonellosis, rabies, tularemia, leptospirosis, amoebic dysentery, typhus, jaundice, trichinosis, rickettsial pox, lymphocytic choriomeningitis, ray fungus, and ringworm. Also, they transport and host ectoparasites, especially mites. Mites living temporarily on rats and mice in their nests and burrows can, following treatment of the house and birds for mites, quickly reinfest the premises with mites. When you sell birds on mite-infested farms, migrating rodents can transport mites to adjacent farms. Rats can transport 18 different kinds of mites, lice, fleas, and ticks.

When you market poultry at the end of a production cycle and clean the poultry house, rats tend to migrate to other places where they can get feed and water. There are cases, of course, where feed is left in the feeders or spilled around feed bins and water remains available in the house or in a stream or pond nearby during cleanout time. Then, most of the rats will not move elsewhere. But it is believed a lot of rats do migrate between poultry farms during cleanout or down time, and the rats may spread some poultry diseases and ectoparasites as they travel.

Using disinfecting foot pans for poultry caretakers and service persons is good and should be encouraged, as should other sanitation measures, but you should remember migrating rats do not use disinfecting foot pans when they enter and exit the house. Also remember that rats, in most cases, get directly in a feed trough to feed, and they drink directly from the waterer the chickens use. Therefore, rats can be an ideal means of transporting diseases from farm to farm.

### Estimating Your Rat and Mouse Population

Use this thumb rule to determine your rat population. If you never see rats but see signs of them, there are from 1 to 100 on the premises. If you see them occasionally at night, there are 100 to 500. Occasional daytime and numerous night sightings indicate 400 to 1,000. Seeing several in the daytime may indicated a presence of as many as 5,000. When one farmer sold his laying flock he decided to get rid of the few rats in his hen house. The score at the end of his extermination program was 1,800 dead rats.

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## **Controlling Rat and Mouse Populations**

The best way to control rats and mice is to close all access routes into buildings, but this is difficult to do in poultry houses. The second best control method is to remove all shelter, food, and water, which again, poultry farmers are not able to do. That leaves using one or a combination of poisoning, trapping, or using cats.

### **Using Cats**

Some poultry people consider cats a nuisance and a possible hosts for disease. However, when properly managed, cats do control mice in cage laying houses but cannot be relied upon to reduce rat populations severely, although they will restrict a population buildup. Cats work best when they are not permitted to leave the house. During flock changes it is best to catch and confine the cats until the new flock is in place.

Cats should be kept working. Use one cat per 5,000 laying birds, up to a total of five cats per house. More than five cats per house may reduce hunting activity. Young (less than five years old) female cats make the best hunters. Males only occasionally hunt well.

Cats should be well fed and watered to maintain good vigor. They do not have to be starved to cause them to hunt mice. A bowl kept supplied with a dry commercial cat food and fresh water nearby is a good feeding program.

Provide a litter box with commercial litter, sand, or sandy soil and an open-topped sleeping box with some sort of soft bedding. Cats kept confined to poultry houses seldom experience difficulty with diseases.

### **Trapping**

Trapping is a practical way to remove rats and mice on relatively small poultry farms, but in commercial operations you need too many traps and it takes too much attention to remove dead rats and rebait the traps to be practical.

If you use traps, many foods make good baits-peanut butter, meat of nuts, doughnuts, cake, fresh crisp-fried bacon, cheese, raisins, strawberry jam, milk chocolate, apples, gumdrops, prunes, and pineapple.

Enlarging the trap trigger with cardboard makes it more effective.

Place the traps across or near paths rats or mice normally use. Both rats and mice, because of their poor eyesight and for protection, like to run close to walls. Because mice travel only short distances, set traps every 10 feet. With rats, place traps every 25 to 50 feet.

Rats and mice are accustomed to human odors. Therefore, you don't need to boil or handle traps with gloves. Remove dead animals from the traps regularly.

### **Using a Rodenticide**

Rodenticides are usually mixed with some bait material or materials. Selecting the right

bait is important, especially where a plentiful supply of good feed is available, as in poultry houses. Also, the Norway and roof rats and the mouse each have bait preferences. Therefore, it is important to know which of these rodents you plan to poison so you can choose the right bait material. *Remember:* If you use rodent control for rats only, mice will multiply rapidly once the rat population is under control. (The mice do not have to compete with the rats.)

#### Using Antifertility Agents

Research is being conducted to develop chemosterilants (antifertility agents) for rats and mice. Once developed and marketed, these drugs will probably be a follow-up to a rodenticide.

#### Using Chemical and Mechanical Repellents

Chemical and mechanical rat and mouse repellents have been tried, but neither seems to control rats and mice in and around poultry facilities.

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## Bait Preferences and Care

#### House Mouse

House mice prefer canary seed (bird seed), prunes, pineapple, jelly beans, peanut butter, chopped apples, corn, wheat, oatmeal, milo, doughnuts, cookies, and sweet chocolate candy. They also like the juices of prunes and pineapple.

House mice are nibblers and like to try new foods. Using baits different from the usual food source often works well on mice, with two or three choices of baits in small amounts, instead of using more of one bait.

#### Roof Rat

The roof rat is a finicky eater, wary of everything new in its environment, including food, and does not readily accept meat or fish. The roof rat likes cereal grains, chopped apples, sweetpotatoes, melons, prunes, pineapple, cookies, doughnuts, sweet chocolate candy, peanut butter, and tomatoes.

#### Norway Rat

Norway rats readily accept fresh meat and fish. They usually prefer a bait higher in protein and fat than their normal diets. Also, they like peanut butter, sweet chocolate candy, lettuce, tomatoes, apples, carrots, bananas, corn, milo, wheat, and doughnuts. Norway rats are gluttons and accept a greater variety of baits than do roof rats. Also, they are not as wary about new objects or food in their territory as is the roof rat. This makes them a little easier to bait and trap.

Many ingredients are added to bait mixtures to enhance the bait's acceptance by rats and mice, but about the only truly effective, readily available enhancers are 5 percent sugar,

bacon drippings, and peanut or corn oil added to the bait mixture. Five percent sugar and 5 percent oil may be added.

As you can see, you can use a variety of baits with rodenticides. The important thing to remember with any bait material is that baits and bait containers must be fresh and clean for best acceptance. Thinking that rats and mice prefer spoiled, unclean food is false. The truth is, they are actually little different from other mammals in that they prefer fresh, clean food.

Rats and mice move in search of food before eating stale, sour, moldy, or feces and urine-contaminated food. It is estimated rats and mice eliminate 80 percent of their daily feces and urine waste as they are feeding. Therefore, you should present baits to them in a manner that tends to decrease rat or mouse contamination. Because of this, bait stations that dispense anticoagulant-type poison bait as it is being eaten are normally better than an open-top bait container that lets rats and mice contaminate the bait with their body wastes. Shallow trays, dishes, and boards may work well for quick-kill bait, since it should be removed and replaced every day or two anyway.

#### Choosing a Bait or Bait Mixture

When considering which bait or bait mixture to use with poisons in an occupied poultry house, consider that rodents already have an excellent bait (chicken feed) readily available. Therefore, it is sometimes difficult to find just the right bait material to use, one that will be more acceptable than the chicken feed. Prebait testing may be necessary.

If you mix poisons with such bait materials as ground meat or fish, peanut butter, ground prunes, or pineapple, you can spread the mixture (may need to add a little water) on thin slices of bread and Ritz or graham crackers for distribution. It is usually best to divide the material into approximately 1/2- to 1-inch pieces and make numerous placings over the area instead of using larger pieces and fewer placings.

#### Suggested Dry and Water Bait Mixtures

*Dry Bait Mixtures* - These are some dry bait mixtures rats and mice accept: (Note: With each mixture listed, reduce percentage level of the major ingredient to allow adding the proper level of rodenticide.)

1. A good, high protein bait mixture is 60 percent poultry offal meal, 5 percent sugar, and 35 percent poultry mash. (Reduce poultry offal meal to allow for rodenticide.) This is a good Norway rat bait, since they prefer high protein baits. Roof rats and mice may also accept it. Because of its high protein content, this mixture is suggested for poultry houses with or without chickens in them.
2. Mix 90 percent poultry mash, 5 percent sugar, and 5 percent peanut or corn oil. (Reduce poultry mash to allow for rodenticide.) Rats and mice should accept this mixture. It is more effective just after you remove chickens and feed from the house.
3. Canary grass seed (80 percent), 10 percent poultry mash, 5 percent sugar, and 5 percent peanut or corn oil. (Reduce canary grass seed to allow for rodenticide.) This mixture is probably best for mice.

4. Corn meal (90 percent), 5 percent sugar, and 5 percent peanut or corn oil. (Reduce corn meal to allow for rodenticide.) Both rats and mice will accept this bait, but acceptance may be limited where poultry feed is available for the rats and mice. Acceptance of this bait is usually best when used in the absence of poultry feeds.
5. Use the same mixture as in #4 bait except substitute cracked corn, soybean meal, milo, rolled oats, wheat, or a mixture of these for cornmeal. Because soybean meal has a higher protein content, rats may prefer soybean meal to cornmeal, while mice may prefer cornmeal or a mixture.
6. Poultry feed (mash or pellets) 100 percent. (Reduce level of poultry feed to allow for rodenticide.) You may use this bait for both rats and mice. Acceptance will be good if you use it just after you remove chickens and feed. Otherwise, rats and mice pass by the bait stations and go to the fresher, less contaminated feed in the feeder lines and pans.

*Water baits* are effective for rat control in certain situations, and some rodenticides (quick kill and anticoagulants) are sold in water soluble form. Water baiting works best for rat control where water has been available but is unavailable at the time of poisoning. Such a situation can exist just after you have removed the chickens from a poultry house and have cut off and drained all the waterers.

Chick drinkers make good water bait dispensers. Clean well after each use. You may use water bait poisoning along with feed bait poisoning for a more effective total population kill.

You may improve rodent acceptance by adding sugar to the water at the rate of 5 percent. In addition, you may add 5 percent prune, pineapple, apple, or grape juice to help increase acceptance. If you add sugar, use unsweetened juice. Since mice can live on little water, water baiting is normally more effective with rats because they need moderate amounts of water daily. However, mice will accept water baits reasonably well when you add sugar and juice.

### Establishing Bait Stations

When dispensing poison bait or establishing bait stations, consider these points:

1. Because rats and mice have poor eyesight, they tend to run beside walls or other stationary objects and use their keen sense of touch in their whiskers and the guard hairs on their bodies to help guide them. These sensitive hairs help them travel in the dark, in their burrows, and in search of food and water. They do not often leave their established pathways unless the environment or food and water supplies change.
2. Neither rats nor mice travel any farther than necessary to reach food and water.
3. Place baits where rats and mice live and travel-not scattered at random or just where placement is convenient.
4. Rats are social animals and, within the same species, will use the same food, water source, and runways-and might even nest close together. They range, if necessary, as

far as 150 feet to get food and water but prefer to travel much shorter distances if food and water are available. Therefore, you should put rat baits every 25 feet.

The house mouse, however, is a "loner." In each territory there are one or more females, food, and shelter. The male mouse does not willingly share his territory with another adult male mouse. Therefore, you can control mice only by many bait placements—at least one in each territory. A territory is usually not more than a 10x10-foot area. Some mice, for example, spend their entire lives in a pallet of feed. Mice require very little water and get much of what they do need from foodstuff, which aids their being able to occupy such a relatively small space. Place baits for mice 10 feet apart.

### **Test Baiting**

Test baiting determines what baits rats or mice prefer before you distribute a poisoned bait. You should not test more than three types of bait at the same time. Then use the most readily accepted bait during pretesting with a toxicant. Since mice prefer to nibble and readily try different foods, test baiting for mice is usually not necessary.

### **Prebaiting**

Prebaiting is the exposure of unpoisoned bait for two to six nights before using poisoned bait. It accustoms rats to feeding on a certain food at a certain place each night. Prebaiting helps overcome the rats' natural reactions to avoid new foods and bait shyness in previously poisoned (sublethal dose) rats. Prebaiting may, to some extent, be a part of a test baiting program. Also, you may prebait to help determine how much and where poisoned bait is needed. After two days move unused bait stations near stations that are being used.

### **Amount of Poison Bait to Dispense**

When you dispense poisoned baits, place enough bait to feed all rodents present. Otherwise, some animals will receive just enough of the bait to make them sick. Then they become bait shy. The amount of poison bait needed depends on the rodent species, the size of the infestation, and the toxicant used. Since each location contains so many variables, prebaiting and test baiting are the best ways to determine what bait to use, how much bait to use, and where to place it.

Continued re-use of the same bait and rodenticide in the same location generally results in decreased acceptance, bait shyness, and poor control. Baits and rodenticides should, therefore, be rotated periodically.

### **Treat for Rats, Mice, or Both**

It is not uncommon to find rats and mice living in the same area. However, it is less common to find Norway and roof rats occupying the same area. The Norway rat is larger and more aggressive and can drive away roof rats.

In cases where rat populations have been drastically reduced by poisoning or some other method, mice will often move in and rapidly increase in numbers.

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## Selecting and Mixing Rodenticides and Bait Materials

### Rodenticide Sources

Many commercially prepared bait and poison mixtures are available. A list of manufacturers and distributors, consisting of the companies that responded to a request for their product information, is available by writing to Dr. Tom Smith, Cooperative Extension Service, Mississippi State, MS 39762. Many of the companies listed also market rodenticides in concentrate form for use in mixing with a selected bait.

### Mixing Baits and Poisons

If you mix at the farm, use reasonable safety precautions. As the toxicity of the rodenticide increases, so should the safety precautions. Wear a respirator to prevent inhaling poison laden dust particles resulting from mixing. None of the commonly used rodenticides will be absorbed through the skin (except through cuts) but gloves are recommended.

You can mix small lots of bait in a container with a large spoon or paddle or by agitating it inside a plastic or heavy paper bag. Larger lots (up to 10 pounds) are more easily and better mixed with a hand-held electric mixer or with a mixing device attached to an electric drill. Whichever method you use, mix thoroughly. Check the label for ration and mixing instructions.

Poisoned baits should always be mixed and placed in clean containers. Scents picked up by the bait from unclean containers can reduce bait acceptance by rats and mice-especially roof rats. After mixing, be careful to clean all mixing utensils thoroughly.

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## Placing Quick-Kill Poisons

### Broiler House

In broiler houses, the best time to use quick-kill poisons is the first day or two after you remove the chickens. After selecting a quick-kill poison (and bait if mixing is needed), the important thing is deciding where to place it. Since rats and mice are accustomed to eating out of the feeder line, the best place to distribute poisoned bait is in or under the feeder line, assuming, of course, you remove the birds from the house before beginning poisoning. Rats and mice tend to return to where they have been feeding and are more wary of anything new. They are more likely to accept the poisoned bait if it is near their customary feeding spots.

Let the birds clean up most of the feed in the trough before you move them from the house. The morning after moving the birds, lower the feeders back in place and clean the remaining feed from the troughs. Also clean the feed bin or any place where rats and mice can get feed. Put some water troughs back in place with water in them. Place the bait on bread, crackers, shallow cups, egg cartons, cardboard, or similar appropriate station material and locate in or under the feeder line. Also put bait in areas you know rats and

mice use, such as around feed bins and along runways. Use quick-kill baits in this way for two or three days. Remember to change baits often to keep them fresh. After the first or second day, move some of the unused stations near those most frequented by rats and mice. The reason for poisoning the day after the chickens are moved is to kill the rats or mice while their feed supply is limited and before they locate other sources of feed and water.

Rats and mice that eat nondeadly doses of the quick-kill poisons become wary of accepting the same poison again. Because of this, using the same type quick-kill poison sooner than three months after initial use will reduce its effectiveness. Changing both the bait material and quick-kill poison encourages rats and mice to accept the poison at more frequent time intervals. By alternating baits and poisons, you can use quick-kill poisons at two to three-month intervals for best results. Be sure to remove all unused, unprotected poisoned bait from the poultry house before replacing the chickens.

### Cage Laying House

In occupied cage laying houses, place quick-kill poison baits on concrete walkways underneath feeder lines. Rats and mice are used to eating spilled feed from that area. Prepare baits the same way as suggested for broiler houses.

*Caution:* Be careful to keep children, pets, and other animals out of the houses while you use quick-kill poisons. Also, dead rats and mice killed by anticoagulants, if eaten by cats, dogs, or other animals, will sometimes kill the animal eating the dead rodents. Therefore, consider penning such animals for a few days to protect them. It might be a good policy to warn neighbors before using poisons. Because rats and mice can transmit diseases, use tongs or a glove to pick up the dead animals.

Read the label carefully before opening a container. Rodenticides are poisonous. Follow directions and precautions.

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## Placing Anticoagulant Poisons

If you use anticoagulants (slow kill) poisons, remember that with most anticoagulants, rats and mice must eat some of the poison daily for at least five days before they begin to die. Some information suggests that if rats and mice do not eat any anticoagulant poison for two days, they recover almost completely for the poison's effect. For example, if they eat poison for four consecutive days but not on the fifth and sixth days, you may have to start all over again with the poisoning program. For this reason, most recommended anticoagulant baits should be available continuously for at least two weeks. A minimum 2-week poisoning period is, therefore, recommended when using most anticoagulants because the rats or mice may not feed on the poison every day during the time the poison is out. Some of the more recently available anticoagulants are reported to kill in only one to three days of feeding.

If you mix anticoagulant baits and use according to directions, a population of rats and mice normally do not detect the danger from consuming the poisoned bait.

After 6 to 12 months of poisoning with an anticoagulant poison, it might be advisable to change to different bait and poison materials to kill rats and mice that may have become wary of or resistant to the materials being used.

### **Broiler House**

In broiler houses, the day after you move the chickens, empty all feeders or feeder lines. Place about a half pint of anticoagulant poisoned bait in each feeder line or a feeder pan every 25 feet down the length of the house. You probably get best results from leaving the feeder line in a lowered position, but you may raise it back out of the way if bait stations are used.

Check the line, and, where needed, add fresh bait each day. If you openly place too much bait at one time, the rats and mice spoil it with their body wastes. Bait-dispensing containers, such as cleaned milk cartons and soda pop or beer cans with holes, appropriately placed to let the bait feed down as it is being consumed, might work better than poisoned bait placed openly.

### **Cage Laying House**

In occupied cage laying houses, the best placement seems to be pouring a ¼-inch deep narrow band of the poison material on the walkways under the feeder lines. Rats and mice seem to accept bait on runways better if it is poured in a narrow band under the feeder lines as opposed to placing it in small piles. The walkways along the outside and end walls will normally be the most frequented areas by rats and mice (especially mice) because it is easier for them to return quickly to shelter.

Dusting these areas lightly with flour a day or two before poisoning begins lets you see rat and mouse tracks. You can then know where and how much bait to place according to the track patterns.

Try to poison rats and mice as soon as possible after you sell the hens and have removed the rodents' usual food supply. Remove layer feed, sweep walkways, leave some water available, and place bait on runways and/or in feeder line (one feeder per set of cages) every 10 to 25 feet.

### **Slatted Breeder House**

You may use both quick-kill and anticoagulant baits under the slatted area any time so long as the birds cannot reach and eat the baits.

Slatted breeder houses provide an almost ideal environment for rats and mice. They are protected from the chickens and predators while under the slats, feed and water are readily available to them, and they can burrow into the soil or manure buildup to find nesting space and security. Mice can find enough food from spilled feed to supply their needs, and since they need very little water, they can live their whole lives in a 10-to 15-foot diameter

under the slatted space. Rats tend to leave the slatted area to get water and greater quantities of feed. Consider these differences when deciding where to place poison bait. It would probably be best to bait for both rats and mice under the slatted area.

In all cases where you use poison baits in the open and in the absence of chickens (in or under the feeder line), be sure to remove and destroy the unused bait before you put chickens in the houses.

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## **Covered Bait Stations For Use Inside and Outside Poultry Houses**

### **Stations That Protect the Bait From Other Animals**

Beside placing poisoned baits in the open while no chickens are present, you may use poison baits any time in covered bait stations. Such stations may consist of 1x8-inch or 1x6-inch boards hinged to a wall area or in covered, locked bait stations for added security.

Place bait stations where the rats and mice have been traveling. Neither rats nor mice tend to vary from their regular travel patterns to eat from bait stations placed elsewhere.

While using poison bait in the poultry houses, it is important to use poison bait in bait stations at other locations that rats may inhabit on the premises. Treat such places as barns, sheds, and in some cases, homes. Otherwise, rats and mice from outlying areas will invade the poultry houses as soon as the resident population is killed. Covered or covered and locked bait stations are usually recommended when used where they may become accessible to humans or other animals. You may use both covered and covered and locked bait stations outside under the eaves of the house on a continuing basis to kill migrating rats and mice before they enter the poultry house and mice that set up housekeeping in rolled-up curtains.

To improve success of rat and mouse control, you must rid the area around the poultry houses of all trash, clutter, boards, barrels, and cans where rats and mice may find shelter and a nesting place. It is also helpful to keep the weeds and grass around the poultry houses and outlying structures cut short because neither rats nor mice like to travel areas with little overhead or side protection.

If possible, get neighbors (whether they have chicken houses or not) to treat at the same time you do. This will help keep your farm from being quickly reinvaded by rats and mice from outlying areas.

A good community or neighborhood program is for each resident to participate in a recommended poisoning program at three month intervals, beginning the first Saturday in January, April, July, and October. These are just suggested times and may be altered to coincide with moving birds to market.

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## Rodenticides

Rodenticides are efficient in destroying rats and mice. Full advantage should be taken of the particular characteristics) of each rodenticide to select those most likely to produce the desired results under existing conditions. Many chemicals used as rodenticides require that the applicator possess a certified applicator permit prior to purchasing the chemicals. Additional rodenticide information pertaining to brand names is available by contacting the Extension Poultry Department at Mississippi State University.

### Zinc Phosphide

Of the single-dose (quick kill) poisons, zinc phosphide may be the most satisfactory, readily available material. It has an offensive odor and is unattractive in color. Rats and mice seem to be attracted by the odor of zinc phosphide, and all species accept it.

Zinc phosphide is not absorbed through the skin while mixing, and only seldom are animals killed from eating the carcasses of rats or mice that have been killed with zinc phosphide. Zinc phosphide is, therefore, listed as mildly hazardous in its use as a rodenticide. Cause of death is heart failure.

### Vacor

Vacor is a single-dose, acute rodenticide; death normally occurs in 4 to 8 hours after ingestion. Little or no bait shyness develops, and it is recommended to be effective against most species of rats and mice. Vacor is most readily available in a formulated ready-to-use bait mixture but is also available to licensed professional applicators in the form of a tracking powder.

### Strychnine

Strychnine is a highly toxic single-dose poison that is effective for mouse control only. It has a bitter taste that causes many rodents, including rats, to avoid it. Therefore, it is not effective against rats. For best results, do not use strychnine more often than at six month intervals.

Strychnine is usually mixed with canary seed, some cereal grain, or other bait that mice prefer. Cause of death is respiratory failure.

### Arsenic

Arsenic is a single-dose rodenticide. It is slow acting and toxic to all animals. It is classified as extremely hazardous. Mice will not accept it. Less hazardous and more effective poisons are available; therefore, arsenic is seldom used any more as a rodenticide.

### Red Squill

Red squill is another good quick-kill poison. There is even less hazard in using red squill than with zinc phosphide because it causes animals other than rats and mice to vomit and eliminate the poison.

The drawbacks to red squill, compared to zinc phosphide, are that it is effective only against the Norway rat, is generally less acceptable by all rats, has poor reacceptance after sublethal intake, has less overall killing effectiveness, and is not readily available for purchase.

Mix red squill with baits at the rate of 10 percent red squill. Cause of death is respiratory failure.

### Sodium Fluoroacetate (1080)

This material, commonly known as 1080, is one of the most effective rodenticides known. It is virtually tasteless and odorless and kills in one to eight hours. No tolerance or bait shyness develops.

The drawbacks are that it is highly toxic to all animals, has no antidote, and has a high degree of secondary poisoning for animals eating rats or mice killed by 1080. As a result, 1080 is classified as extremely hazardous and is available for use only by licensed professional applicators. Cause of death is heart paralysis.

### Phosphorus

Phosphorus is used little today because better, safer rodenticides are available.

### Norbormide

Norbormide is not presently available as a rodenticide.

### Antu

Antu is used to a limited extent to control Norway rats. It is not considered effective enough for house mice or roof rats.

### Anticoagulants

Brodifacoum, bromadiolone, chlorophacinone, diphacinone, fumarin, pival, PMP, warfarin, and prolin (warfarin plus a vitamin K inhibitor) are all anticoagulant-type poisons.

At recommended concentrations, repeated feedings are normally necessary to cause death. One dose is seldom lethal. Therefore, anticoagulant baits must be made available continuously for 5 to 14 days. Reasonable control of rats may not always occur within two weeks, and it may require as long as a month to control mice. The necessity for repeated doses is a built-in safety feature of the anticoagulants for most animals.

Anticoagulants are, in general, classified as a low-hazard method of rat and mouse poisoning because of the multiple feeding requirement. They are effective against both rats and mice and, when used at the recommended level, bait shyness is not developed. The drawbacks to anticoagulants are that bait placements have to be made for several days, there is danger to animals feeding on the carcasses of rodents killed by anticoagulants (cats and dogs are very susceptible to anticoagulants and may be killed by a single feeding of poisoned bait), and resistance to anticoagulants may develop in a population of rats or mice

(best to change anticoagulants periodically). Some rat and mouse populations have become resistant to warfarin.

You may use anticoagulants with any of the baits or bait mixtures rats and mice accept. However, since the anticoagulant poison bait must remain available for several days for rats and mice to feed on, anticoagulants are usually mixed with some type of cereal grain or dry-feed-type bait as opposed to baits like apples and prunes.

Anticoagulants and single-dose poisons are available in concentrate form for use in custom mixing and in commercially prepared poison and bait mixtures. You can get these mixtures in wax-impregnated-pelleted or block form, in small bags or boxes, or in oil-soaked bait form, all of which help protect the bait and poison from breakdown from the environment until rats or mice eat it.

**Tracking Powders** There are no chlorinated hydrocarbons approved as a tracking powder. Antu is effective only for Norway rats. Rozol is an anticoagulant registered for rat and mouse control. Warfarin is registered for mouse control.

Vacor is classified as a quick-kill poison and is available to licensed professional applicators as a tracking powder. Tracking powders are not recommended where rodents can track the poison onto food destined for consumption by other animals. Therefore, be careful when using tracking powders in occupied poultry houses.

### **Fumigation**

Fumigants such as methylbromide and others are fast and effective controls for rats and mice in burrows or tightly closed buildings. Be extremely careful; leave the application of fumigants to licensed professional applicators.

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Adapted from a publication by Dr. Robert L. Haynes, retired Leader, Extension Poultry Science

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