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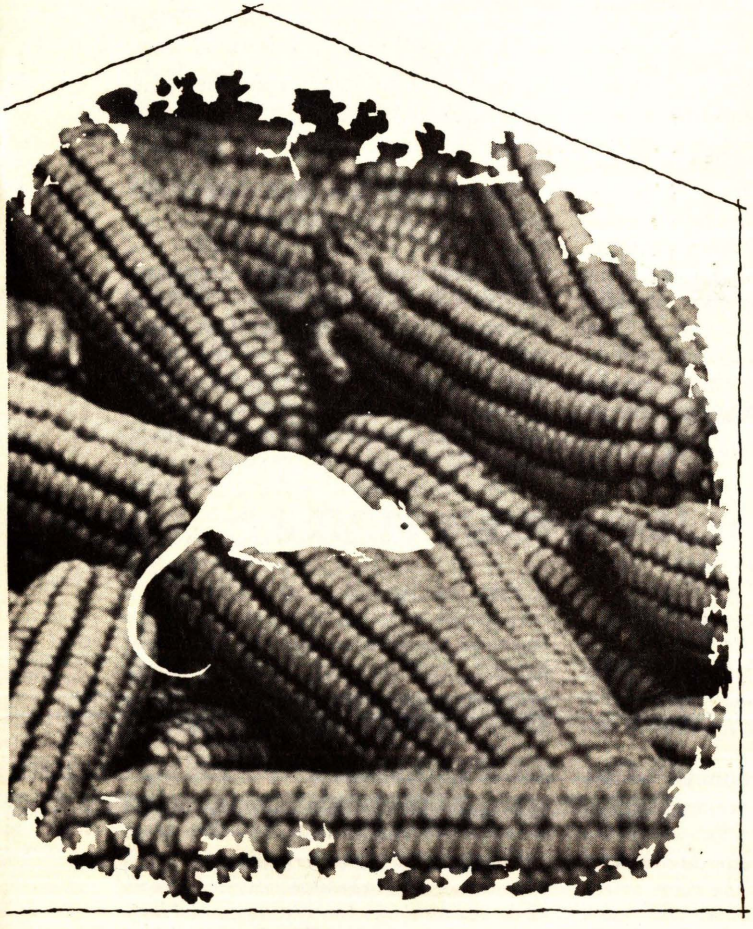
by John A. Lofgren, Extension Entomologist



AGRICULTURAL EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
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Rat and Mouse Control On the Farm

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Each year the Norway (or brown) rat and the common house mouse consume thousands of bushels of grain and other foods on South Dakota farms. They attack grain in the field and in farm storage. At the time they consume the grain they also pollute and contaminate it by their droppings, urine and hair. Every 24 hours each rat voids an average of 70 pellets and about 15 cc of urine. Such contamination makes food grains subject to seizure by the Food and Drug Administration because they are unfit for human use. The monetary losses resulting from such seizure of wheat may run as high as $1.00 per bushel.

These rodents also attack poultry and livestock, carry diseases to man and livestock, destroy property by gnawing and burrowing and cause fright or embarrassment by their presence. The total loss from rats alone has been estimated at about $20.00 per rat per year. One does not have to search long for reasons to control rats and mice.

Ways to Detect Rats and Mice

Gnawing—Look for gnawing damage around doors, windows, vents and other openings.

Burrows—Fresh dirt and holes around foundations, under sidewalks, platforms, embankments are indications of rats.

Droppings—Fresh droppings on the grain surface near corners, behind objects near walls or in other places seldom cleaned are sure signs of rats and mice.

Tracks—Rats and mice will leave their tracks in dusty places along walls where they travel. Flour may be used as a tracking powder to detect them.

Test Baiting—Place some food like corn meal or rolled oats along possible runways and observe results for a few days.

Nests—In cleaning out machinery or granaries, mouse nests are frequently found. They are good indications of mouse infestations.

Live Rodents—By switching on lights in a dark barn, granary or other farm buildings, you may be able to see or hear rats or mice scampering for cover. When rats are extremely numerous, they may be seen during the day especially when feeders, lumber, trash, etc., are moved.

How to Control Rats and Mice

The goal in preventing rodent contamination of grain and foods should be to keep the rats and mice out of the granary or storage bins and not to kill them after they get in. If a program of rodent poisoning is carried on in the grain bins it follows that some contamination will occur before the rodents are controlled. Therefore attention should be given to building and repairing storage buildings to make them rodent proof and also to a baiting program which will control the rodents around the perimeter of the farm buildings. Sanitation practices which deprive rats and mice of food and shelter should be the foundation of control.

Rat Proofing

A full discussion of rat and mouse proofing cannot be attempted in this circular. Conservation Bulletin 19, **Rat Proofing Buildings and Premises,** published by the U. S. Fish and Wildlife Service, Department of Interior, contains a wealth of information on the subject.

All new buildings should be made rat and mouse proof whether they are barns, granaries, poultry houses, corn cribs or the farm house. Rat proof foundations, tightly closing doors with gnawing edges flashed with metal, closure of vents or crawl spaces with screen are some of the principle points which should receive attention. Buildings without rat and mouse proof foundations should be at least 18 inches above ground level on rat proof piers or blocks.

Old buildings can be rat proofed at a cost less than the cost of damage of a rat or mouse infestation in one year. The important things to check are: close all holes in exterior walls with gnawing-resistant materials; raise buildings without rat proof foundations at least 18 inches above ground level; install self-closing devices or springs on frequently used doors.

A rat-proofed farm does not mean that every building is absolutely rat or mouse proof; rather it is one where conditions

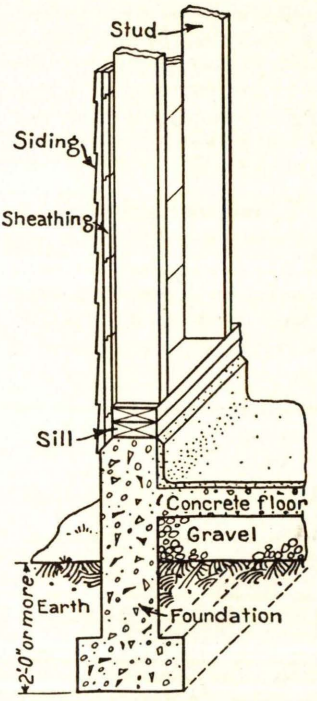

Fig. 1. Foundation and floor suitable for most types of farm buildings.

are so unfavorable for rats that they leave or may be easily killed by an economical poisoning program.

Remove Shelters, Harborages

Rat proofing farm buildings, granaries or corn cribs will eliminate many harborages but there are others which are frequently overlooked. Double walls should be avoided wherever possible or sealed with rat and mouse proof materials. Piles of lumber should be stacked up on racks at least 18 inches above the ground or floor. Junk and trash should not be allowed to accumulate next to the

walls of buildings. Weeds and other vegetation should be kept down around buildings, especially around granaries and corn cribs. Keep it mowed or use herbicides. Rats frequently breed in old manure piles that remain undisturbed for long periods of time. For this reason, and also to reduce fly breeding, a regular program of manure disposal should be followed by returning it to crop lands. Paying attention to neatness and orderliness will make unfavorable conditions for rats and mice.

Remove Food Supply

Rats and mice eat a wide variety of foods and any practice which deprives them of food will result in fewer rodents. The food supply on any farm will support a certain number of rats and mice.

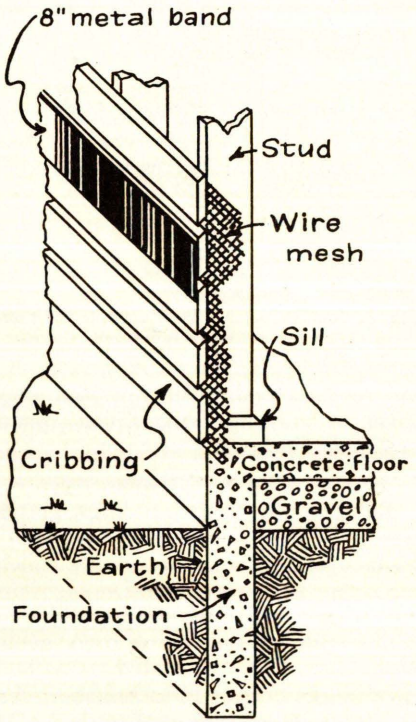

Fig. 2 Suggested base construction for corncrib.

By decreasing the available food supply the potential rodent population will be lowered. A sanitary garbage disposal system should be set up and carefully followed. The use of landfill type disposal pits where the garbage is compacted and kept covered with soil is recommended. Garbage and kitchen scraps should be kept in tightly closed metal containers until disposed. Livestock and poultry feed should be stored in rodent proof storage bins, containers or buildings. Keep feeding areas cleaned up of excess feed. Such a sanitation program must be a constant, continuing thing to be effective; a clean-up once a year is not enough.

Rat, Mouse Poisoning

It may be possible to control rats and mice for a time with a poisoning campaign alone. But, unless the rat proofing and sanitation steps outlined above are followed the rodents will increase again and the poisoning program will be more costly because there will be more rats and mice to eat the bait. Therefore, for best results poisoning should be conducted after, or in conjunction with, these other rodent suppressive measures.

There are many rat and mouse poisons available but the ones which will fit into most farm conditions and work under a variety of conditions are the anti-coagulant poisons such as **warfarin** and **pival.** In many cases a quick reduction of the rat infestation may be obtained by using a fortified red squill bait but this should be followed with an anti-coagulant baiting program to finish the job and to control the mice. When using red squill, use a variety of foods for the bait. Mix one part of the fortified red squill powder to 9 parts of the food material such as ground meat, fish, rolled oats, corn meal, etc. It is very important to use enough bait to feed all the rats. A good practice is to pre-bait with unpoisoned bait for one or two nights in order to determine accurately

how much bait to use and where to put it for best results. After a couple of days the uneaten red squill bait should be picked up and destroyed. After an

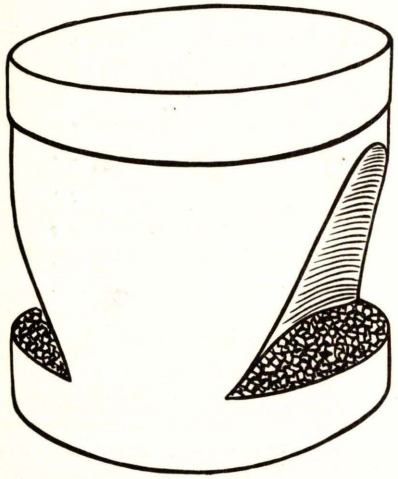

Fig. 3. A suggested self feeder may be made from a half-gallon ice cream or frozen food container.

exposure to red squill those rats which have not eaten a lethal dose will become bait shy.

When using the anti-coagulant baits the most important things to remember are to use enough and to keep it available at all times. The anti-coagulants are accumulative poisons—several successive meals must be eaten before they will kill rodents. If there is a break in this feeding period the rats and mice will recover and the baiting must be started again from the beginning.

Two of the most generally available anti-coagulant poisons are warfarin and pival, and their water soluble forms. These are available as concentrates, which must be mixed with a suitable bait, and as ready mixed, ready to use baits. They are sold under many different trade names but information on the label of the container will tell you what it is and how to use it. It is very important to read the labels.

Generally, it is more economical to buy the concentrate and mix your own bait, but it is easier and quicker to buy the ready mixed bait. The important thing to remember if you mix your own bait is to use a food which will not spoil and one which is attractive to the rats and mice.

Two suggested bait formulas for both rats and mice are:

Corn Meal	6½ lbs.
Rolled Oats	2 lbs.
Powder Sugar	½ lb.
Vegetable or Mineral Oil	½ lb.
Anti-coagulant Poison (0.5%) concentrate, warfarin or pival)	½ lb.
TOTAL	10 lbs.

Corn Meal	4½ lbs.
Rolled Oats	4½ lbs.
Vegetable or Mineral Oils	½ lb.
Anti-coagulant Poison (0.5%) warfarin or pival)	½ lb.
TOTAL	10 lbs.

Freshly ground whole corn meal is preferred but the common household corn meal will work in most cases.

Placing the bait is important. For controlling rats place the bait where they can easily find it or where they are used to eating. Put the bait stations near rat runways next to walls. If the rats are not feeding at a particular station move it to a more favorable place. On the average farm two to five one-pound stations in the barn, two or three in or on each corn crib, two around each granary and one in or around each of the other problem buildings such as poultry house, hog house, machine sheds, etc., should be enough.

To control mice it is recommended to use smaller bait placements of about three or four ounces placed at frequent intervals along the walls. These stations should be not more than 12 or 15 feet apart because mice do not range far

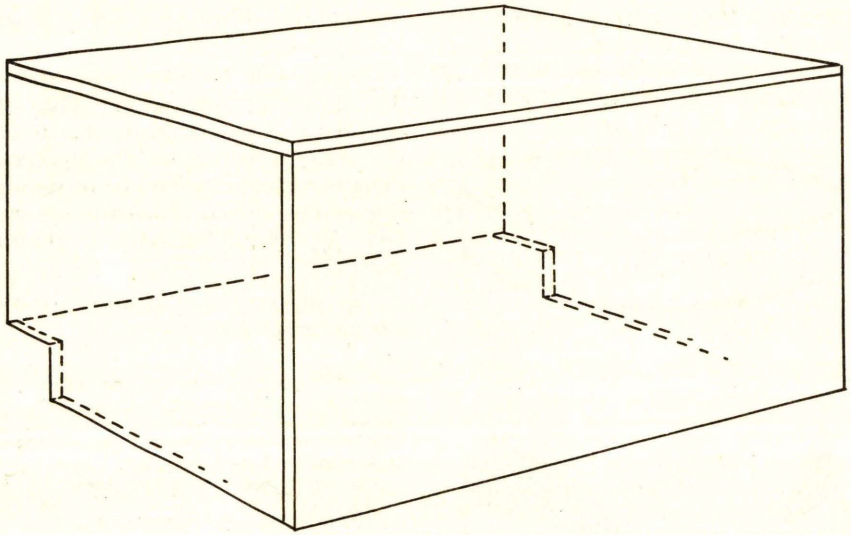

Fig. 4. Bait should be protected from other animals, children and the weather by a bait box.

from their nests for food. Strychnine-treated grain may be used for a quick kill of many mice in most situations. A tracking powder of 50% DDT powder dusted along mouse runways and in mouse harborages will also kill many mice. A few rats or mice in a home may be controlled adequately through the proper use of traps.

The feeding stations supplied with warfarin or pival should be protected from the weather and from pets, farm animals and children. The easiest way to do this is to cover the bait with a tight box with a 2-inch hole cut in each end. There are many different types of bait stations which work effectively. The main thing is to use those which protect the bait, are inviting to the rats and mice and are economical and easy to use.

The water soluble forms of the anti-coagulant poisons may be used effectively where there is a limited supply of water available for the rodents. It is generally available in small packets or envelopes each of which is enough for one quart of water. It may be used satisfactorly in chick watering fountains which should be covered with bait boxes to keep other animals from drinking it. In many situations it is effective to place a water bait near a dry bait, even in the same bait box.

Warfarin and pival baits must be eaten continuously for five to 15 days before they will kill. Therefore it is extremely important to examine the bait stations daily during the first week and to replenish the bait as needed. After about two or three weeks if the feeding has dropped off and control is evident a few bait stations should be left at strategic locations and kept supplied with fresh bait to control any stragglers or rats which may move in from neighboring areas. Thus, once control is obtained, a few well placed bait stations will prevent reinfestations.

Warfarin and pival will kill any warm blooded animal if taken in repeated dosages or if a lethal level is reached in the animal's blood stream. Hogs are especially susceptible to warfarin and

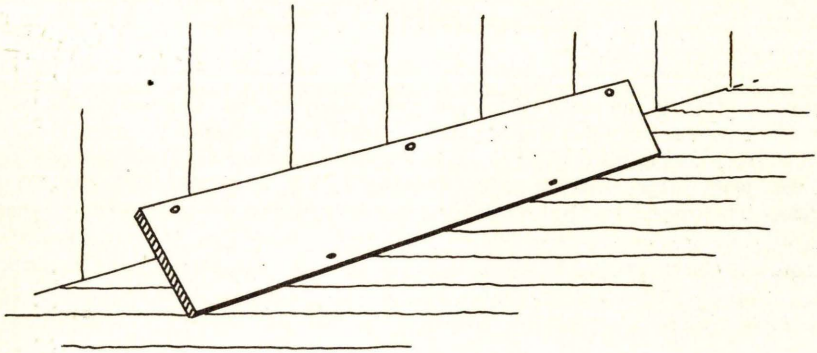

Fig. 5. Bait may be protected by a board placed against the wall and nailed in place.

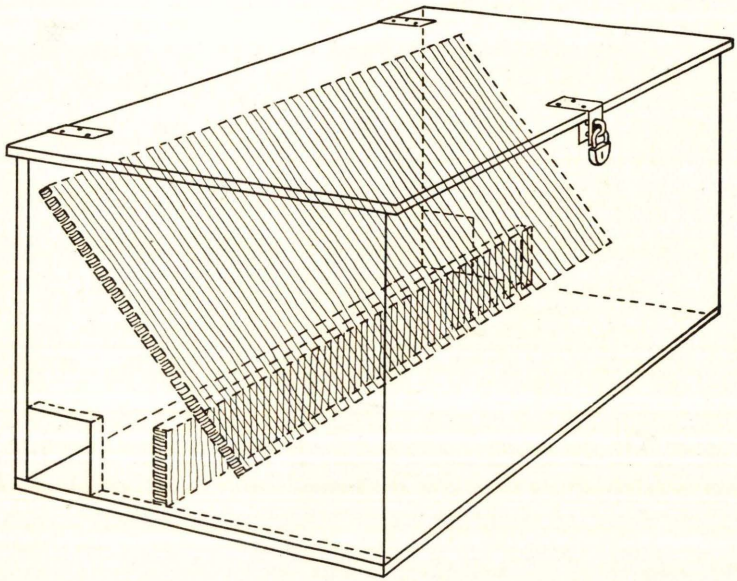

Fig. 6. Shown is a good permanent bait box which may hold several pounds of anti-coagulant bait.

pival. For this reason dogs, cats and other animals should be well fed during the baiting program and bait boxes as described above should be used. In the case of accidental ingestion by humans, vomiting should be started and a physician called. The physician should be told that warfarin or pival was eaten and the treatment should be as that for poisoning by dicumarol—whole blood transfusions and vitamin K.

Many rats will die in their burrows but dead and dying rats or mice in and around buildings should be picked up and buried so that dogs, cats and hogs will not eat them. If these animals eat large numbers of dead rats or mice, they may be affected by the warfarin or pival in the rats or mice, a condition called secondary poisoning.

Community Action

Since these rodents, especially rats, respect no property lines and move from one place to another the best way to achieve long lasting results is by means of a well planned, organized, continuing community program. The leadership and organizing should be handled by a community committee, a farm organization, crop improvement association, 4-H Club, FFA Chapter or similar group. Efforts should be made to enlist the cooperation of every citizen in the community, town and country. Technical assistance may be obtained from the U. S. Fish and Wildlife Service, South Dakota Department of Health and the Agricultural Extension Service. Results of such efforts will be monetary savings and healthier places in which to live for everyone in the community.

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