

# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE COLLEGE  
MANHATTAN, KANSAS

DEPARTMENT OF ZOOLOGY

## CONTROL OF MAMMALS INJURIOUS TO AGRICULTURE IN KANSAS<sup>1</sup>

GEORGE E. JOHNSON

Revised by

E. H. HERRICK

### TABLE OF CONTENTS

	PAGE		PAGE
INTRODUCTION.....	1	CONTROL OF THE HOUSE MOUSE AND THE	
CONTROL OF THE POCKET GOPHER.....	2	RAT.....	7
ERADICATION OF THE PRAIRIE DOG.....	4	CONTROL OF THE RABBIT.....	8
CONTROL OF THE GROUND SQUIRREL....	6	THE MOLE IN GARDEN AND FIELD.....	8
CONTROL OF THE WOODCHUCK OR		POISON FORMULAE.....	9
"GROUNDHOG".....	6	INFORMATION REGARDING PURCHASE OF	
CONTROL OF THE MEADOW MOUSE.....	6	POISON BAIT.....	10

### INTRODUCTION

The mammals, or haired animals, that are injurious to agriculture are nearly all gnawing animals called rodents. Rodents are distinguished by the presence of two long, curved, chisel-like teeth in the front of each jaw. This pamphlet deals with rodent control, or suppression of those rodents which are harmful, such as the pocket gopher, prairie dog, and rat. It also deals with the destruction of the mole, which is chiefly an insect-eating animal and is not a rodent.

While destruction of the distinctly harmful types of mammals is encouraged conservation of other wild life is urged.

1. Contribution No. 211 from the Department of Zoology.

**CONTROL OF THE POCKET GOPHER**

**The Gopher.**—The pocket gopher has a bulky appearance, especially about the head and shoulders. The head is broad and flat, and the eyes are small; the legs are short, the front ones having long, curved claws with which the animal can tunnel rapidly. The tail is short and almost hairless. The gopher has a vicious disposition.

**Description of Mounds and Runways.**—The work of the gopher should not be confused with that of the mole. From its main tunnel, which may be crooked, branched, and long, the pocket gopher digs short lateral tunnels to the surface and here pushes out the soil in a mound the shape of a palm-leaf fan, or somewhat bean-shaped. (Fig. 1.) It plugs the opening of the lateral, and the plug may be seen as a circular area in the mound near the indented side. There is no ridging of the soil above the runway between the mounds as there is in the case of the mole. Mole mounds, if any are thrown up at all, also are different from those of the pocket gopher in that they are volcano-shaped, with the plug pushed up high in the center.

**Favorable Seasons for Control.**—If unmolested, gophers enter and soon take possession of alfalfa fields, because of the abundant food and the absence of natural enemies. The mounds smother plants and interfere with mowing. Large numbers of roots are cut, leaving the tops to die in dry weather. Gophers may be killed any time they are active. Especially favorable seasons are late fall when food is being stored and burrows extended, and early spring when new mounds are again thrown up. Later in the spring the vegetation tends to conceal the mounds and the gopher population will be doubled or trebled due to the birth of young.

**Methods of Eradication.**—(*Baiting with poisoned wheat (Formula 1, page 9) is recommended as the best method of eradication.*) Poisoned oats are not as effective, probably due to the animal's hulling them somewhat, thereby losing part of the poison. Gophers may be trapped with special gopher traps which are found on the market, but this method is slower, involves more labor, and is less effective than poisoning.

**Baiting.**—The main runway is found by probing with a wagon rod or thin probe. (Fig. 1, *a.*) This is done about a foot from the mound, and on the side where the plug to the hole is seen. (Fig. 1, *A.*) When the rod has been pushed into the ground a few inches and suddenly sinks about three inches more without increased pressure,



**Rebaiting.**—If new mounds are thrown up after baiting, they should be treated as before. Thoroughness pays, and re-treatment should be made as often as necessary. Whenever possible it is well to drag down the mounds after each treatment.

**Need of Cooperation.**—A farmer can keep his fields free from gophers more easily if all his neighbors are likewise working to destroy the gophers, hence, the need for a community campaign against these animals.

#### ERADICATION OF THE PRAIRIE DOG

**Habits.**—The prairie dog is really a squirrel and lives chiefly on vegetation. Burrows are made which go down at an angle for a short distance, then almost straight down for ten or more feet, finally turning sharply to the horizontal. “Towns” are formed which spread over whole pastures, reducing the grazing value one-half to three-fourths. To prevent this loss and also to prevent damage to crops and the spreading of the animals to other farms, the community should unite to exterminate prairie dogs. In this the Kansas law aids, for townships may provide materials and supervision for the work of killing prairie dogs.

**Poison Grain Method.**—The use of strychnine-poisoned oats is recommended as the cheapest, easiest, and quickest method of killing prairie dogs. (Formula 1, page 9.) In effectiveness it probably is equal to any other method, provided the baits are properly applied in clear weather. Kafir and wheat may be slightly more efficient, but are more readily taken by birds and should not be used except where it is impossible to secure clean, heavy oats. Prairie dogs may be poisoned any time during clear weather when they are active. They take the bait most readily, however, early in the morning during late fall or early spring. Early spring poisoning is much preferable to late spring poisoning because it kills the females before the young are born. Also, some pastures are free from livestock at that time.

With a grain sack fastened (one upper corner tied to one lower corner) over the right shoulder and containing a peck or two of poisoned grain, the “town” should be gone over carefully and the occupied burrows treated. A tablespoonful of the grain, or about as much as one can pick out of the sack between the thumb and first three fingers, is scattered by a throw of the hand on the dry, hard ground near the burrow. It should not be thrown on loose dirt, or in the burrow, or in the grass. When young are present and feeding,

two or three baits should be scattered near the home dens. *Emphasis must be laid on properly scattering the bait, otherwise livestock will be endangered by being able to pick up the grain.* If livestock show inclination to eat the grain, they should be kept out until the bait is practically gone or there has been a heavy rain.

**Re-treatment with Grain.**—Frequently where the work has been carefully and thoroughly done all the prairie dogs are killed with the first treatment. More often, however, some animals escape. In two or three weeks the burrows which are still occupied should be re-treated with oats, rather liberally, to make sure there is plenty of the bait. As before, *the grain should be well scattered.* If a third treatment is necessary, wheat or kafir bait should be used. Should a few “dogs” still remain, one may fumigate with liberal doses of carbon disulphide or calcium cyanide.

**Caution.**—*Keep poison grain away from children, irresponsible persons, and animals.*

**Fumigation.**—Near farm buildings, fumigation followed by closing the holes tightly with sod and dirt is less dangerous to farm animals than the use of poisoned oats. An ounce (about two tablespoonfuls) of carbon disulphide is poured on absorbent material (a dry corn cob or lump of dry horse manure will do) which is then rolled into the burrow as far as possible. The liquid evaporates to a heavy gas which sinks into the burrow. This method is effective but is more expensive and laborious than the poison-grain method.

Fumigation may also be done with calcium cyanide flakes, which in the presence of moisture generate hydrocyanic acid gas. A heaping tablespoonful or one and one-half tablespoonfuls are put down the occupied burrow as far as possible with a long-handled spoon. Whether closing the holes yields better results has not been determined, but this should be done near farm buildings to avoid killing poultry.

**Caution.**—Keep carbon disulphide and calcium cyanide in tightly covered or stoppered containers and away from children. Handle only in the open air. Avoid breathing fumes. Do not smoke when handling carbon disulphide.

### CONTROL OF THE GROUND SQUIRREL

**Habits.**— Because of their insect-eating habits, the thirteen-lined ground squirrels should probably not be destroyed except where they are known to do serious damage to crops. Even then, reduction in number is rather to be sought than extermination, especially since they are easily killed and therefore not hard to control.

The gray ground squirrel is larger than the thirteen-lined one and is somewhat spotted instead of striped and is not abundant in Kansas. It tends to stay near wooded lands. Both species of ground squirrels sometimes dig up and eat sprouting seed corn.

**Methods of Control.**— A teaspoonful of poisoned oats (Formula 1, page 9) is scattered near the entrance to the burrow, but not in the burrow. Oats are preferred because they are not readily taken by birds. In addition to treating at the burrows, some of the poisoned oats may be scattered in the part of the field where corn is being dug up.

### CONTROL OF THE WOODCHUCK OR "GROUND HOG"

The woodchuck is found in eastern Kansas. When numerous, woodchucks may do much more serious damage than ground squirrels. They may be trapped to some extent. Treating with two tablespoonful doses of poisoned oats (Formula 1, page 9) scattered on the ground near their burrows will reduce their numbers. The kind of grain should be changed when re-treating. The remaining animals may be gassed with carbon disulphide or calcium cyanide as directed for prairie dogs. The burrow should be tightly covered. Re-treatment should be applied to any opened burrows after a week.

**Caution.**— *Keep all poisons away from children. Do not smoke while handling carbon disulphide. Avoid breathing fumes of either carbon disulphide or of calcium cyanide.*

### CONTROL OF THE MEADOW MOUSE

Serious injury to fruit trees may be done by mice. The trees may be protected by pushing cylinders of quarter-inch mesh wire netting into the ground around the tree trunks. If these are 18 inches high, they will serve as protection against cottontail rabbits also. Sheltering vegetation around the base of the trees and also between the trees should be removed. A wash of about 1 part creosote oil to 2 or 3 of coal tar may be applied to trees two years old or over. This treatment will injure young trees. It will also injure older trees below the level of the ground. Much good can be done by trapping with the wood and wire spring traps used for house mice.

In larger orchards poisoned wheat (Formula 1, page 9) should be placed in pieces of drain tile or wooden poison stations next to the bases of the trees. The wooden stations may consist of small wooden boxes with one or more openings to permit easy entrance. The poison stations protect the grain from weather and from being taken by birds. They also are attractive places for the mice to frequent.

#### CONTROL OF THE HOUSE MOUSE AND THE RAT

The house mouse may be successfully trapped with small, inexpensive snap traps. Baiting with cheese, butter, bacon, etc., is satisfactory. They do not "get wise" to traps as rats do. Poisoned wheat, as used for pocket gophers, is an effective poison for mice. The wheat may be scattered on floors or in runways. Mice usually die before going far, so their bodies frequently are found. Red squill, as directed for rats, may also be used.

Rats do untold damage and are difficult to eradicate. Only a brief statement can be given here. Special bulletins on rat control are available. Dwellings should be built rat proof. The basement should be lined with concrete. No openings should be left between the basement and the spaces within the walls of the house. These should be closed with concrete or plaster. If rats do occur in a house, use different traps and baits, varying them from day to day.

Red squill is an excellent poison for both rats and mice since it is effective and usually harmless to domestic animals. Red squill may be used with almost any bait attractive to rats. Usually it is well to use a bait that is not available to the rat at all times. Commonly used baits are: (1) Fresh fish ground in a meat chopper or cheap grades of canned salmon, canned mackerel, or sardines in oil; (2) hamburg steak or other fresh meat, or hamburg steak with a little fresh or canned fish is attractive to rats; (3) eggs broken, mixed with the squill and returned to the half-shell may be useful if other baits fail; and (4) cereals, such as oatmeal, corn meal, or whole-wheat flour mixed with milk or water may also be used. To prepare these baits, mix 1 ounce of powdered red squill to 1 pound of bait. To some baits a little water may be added to form a thick paste. Mix thoroughly. Place portions of bait about the size of the end of your finger in a place and use a large number of baits in a variety of places.

Traps are not effective if rats are numerous.

If rats are in burrows, an effective method of destruction is to pump calcium cyanide dust into the runs. Calcium cyanide dust is effective only if the rats are in enclosed quarters.



## CONTROL OF THE RABBIT

Where rabbits are not abundant, hunting may be the only method of control needed. Cottontail rabbits may also be trapped in box traps. In the winter, trees may be protected from rabbits by painting with a poison wash. (Formula 2, page 10.) Cylinders of one-inch mesh poultry netting may be fastened to stakes around a tree to avoid injury by rabbits. Wood protectors or burlap wrappings securely tied to the base of the tree are effective, but should be removed in the spring, as they afford protection for insects. Winter pruning may be left in the orchard to attract rabbits from the trees.

If jack rabbits are extremely abundant, community drives may be resorted to as a means of destroying these animals.

Rabbits may be killed with poisoned oats (Formula 1, page 9) scattered in tablespoonful doses along their paths. If a light snow is on the ground, kafir heads that have been dipped in the strychnine mixture make very effective baits. The stalks of the heads are stuck into the ground to protrude above the snow. If birds are about, the poisoned kafir heads should be removed during the daytime. Strychnine poisoned salt is also readily taken by rabbits at any time of year. Great care must be exercised in the use of these poisons to see that livestock is kept away from the baits.

## THE MOLE IN GARDEN AND FIELD

**Work and Habits.**—The mole is not a rodent and therefore does not have the long, curving, chisel-like teeth of the animals already considered. Instead, it has a larger number of small teeth adapted for eating grubs, insects, and worms, which comprise most of its diet. It has a soft, pointed snout, has no visible eyes, and its forelegs are strong and armed with broad trowel-like claws used in digging and pushing up the ridged runways. These raised ridges in the field distinguish its work from that of the gopher, which does not produce ridges between its mounds. The mole hill, if present, is different from a gopher mound in that it is rather cone-shaped, highest in the middle, and rather rough. The gopher mound is bean- or fan-shaped and is smooth and rounded on top.

While their habits of eating insect larvae are beneficial, moles may become obnoxious in undermining lawns and in following corn rows in the fields, especially if the corn has been listed. Probably a mole starts to follow a row because of the ease in tunneling for insects. Mice and shrews sometimes follow mole burrows and eat seeds and bulbs credited to destruction by moles. That moles eat some corn in their paths can no longer be doubted, however.



**Methods of Control.**—Because of their food habits moles are difficult to poison, and trapping with a good mole trap has proved to be the most effective means of control. Of the three types of traps most common on the market (harpoon, scissor blade, and choker), the choker appears to give best results. Whichever type is used, the directions that come with the trap should be followed carefully. Each trap has a broad trigger which should rest on the ridge of the runway, the ridge being first pressed down flat at that spot. When the mole comes through the runway again it raises up the depressed portion and springs the trap.

Repellents are sometimes beneficial in small areas, since moles tend to avoid obnoxious or injurious substances. Putting lye, paradichlorobenzine, or naphthaline in the burrows seems most effective. Flooding fresh burrows with water will sometimes force moles to the surface where they may be killed.

#### POISON FORMULAE

##### 1. Poison Grain

In preparing poisoned grain, select only *clean, heavy* grain. A can or tub holding 5 gallons or more should be used in mixing the 10-bushel unit of poison. The soda foams, so a large container is necessary.

For 10 bushels of grain prepare the poison mixture as follows: Place in the tub 6 quarts of boiling water and slowly mix into this 25 ounces of strychnine (alkaloid), 2½ ounces saccharin, 11/2 pounds baking soda, 4 ounces glycerin, 1 pound laundry starch (first mixed in a little cold water), and 7 pounds of syrup. After the mixture has been thoroughly stirred it may then be poured over 10 bushels of grain. Mix the grain with a shovel on a concrete or watertight floor until every kernel is moistened.

For a smaller quantity of grain, use 1 ounce strychnine, 1 ounce baking soda, 1 tablespoon glycerin, 1 heaping tablespoonful laundry starch, and finally one-fourth pint of heavy syrup. Proceed as for the larger unit already described. This is sufficient for 13 quarts of grain. This formula is the one recommended by the United States Bureau of Biological Survey.

Poisoned wheat and oats may both be obtained from the Department of Zoology of the Agricultural Experiment Station, K. S. C., Manhattan, Kan., at approximately cost. A current price list will be sent on request.

## 2. Poison Wash

Dissolve 1 ounce of strychnine (sulphate, not alkaloid) in 3 quarts of boiling water. Mix one-half of a pound of laundry starch in 1 pint of cold water. Pour the starch into the vessel containing the strychnine. Boil until clear. Add 6 ounces of glycerin, stirring thoroughly. When cold enough, apply with a paint brush to the tree trunks.

### INFORMATION REGARDING PURCHASE OF POISON BAIT

**Baits Available at the Poison Laboratory.**— In order to make available at all times poison baits of the kind recommended, the Department of Zoology of the Agricultural Experiment Station maintains a laboratory for the manufacture of poison grain (Formula 1). All poison materials are unmailable. Small orders go by express. Larger orders can be sent by freight if requested. *Terms:* Cash or C. O. D. The express company adds 30 cents or more for collection on C. O. D. orders.

**Amount of Bait Required.**— One quart of grain is enough for about 40 baits for prairie dogs, pocket gophers, and rabbits; 20 baits for woodchucks; or about 80 baits for ground squirrels. Directions for poisoning should be read and an estimate of the amount of grain needed made before ordering. In order to save express, it is better to order sufficient grain in one shipment than to send for two smaller shipments. Baiting directions are found in this circular, and also in each sack of grain. Poisoned grain retains its strength indefinitely if kept dry.