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WARFARIN -- ITS USE IN CONTROLLING RATS AND MICE

Warfarin is a chemical (3-(alpha-acetylbenzyl)-4-hydroxycoumarin) that prevents the normal clotting of blood and causes rats and mice to die by internal bleeding. The chemical is commercially available as a concentrate, usually containing 0.5 per cent warfarin, or in the form of a ready-to-use bait containing 0.025 per cent warfarin.

The Effect of Warfarin

A single dose of warfarin will not ordinarily kill unless a very large amount is consumed. The poison is most effective when taken in small amounts for about five feedings one or two days apart. Thus, it is important that ample quantities of bait be available for two weeks or more since some individual rats and mice may not eat the bait when first exposed. The control of mice may require a longer period of time than for rats. However, in most instances a marked reduction in bait consumption occurs after about the third day of treatment.

Warfarin may kill cats, dogs, and other warm-blooded animals. Chickens show considerable tolerance to the effect of the poison. On the other hand swine appear quite susceptible. The potential hazard of warfarin is reduced by the requirement of successive feedings. To lessen the chance of accidental poisoning, the bait material should be acceptable to rats and mice but unattractive, so far as possible, to humans and domestic animals.

The danger of warfarin poisoning may be further reduced by the use of protective cover for baits that will permit free access by rats and mice, but exclude larger animals. Also, a good rule to follow is to feed cats and dogs well when poison is exposed. Secondary poisoning, from eating warfarin-poisoned rats and mice, is unlikely if this rule is followed. (See illustrated "Bait Stations for Rat and Mouse Control.")

In the case of accidental ingestion by humans, vomiting should be induced at once and a physician called. Treatment by the physician should include transfusion with whole blood and intravenous and oral administration of Vitamin K preparation as in the case of hemorrhage caused by Dicumarol.

Bait Preparation

Warfarin is apparently quite odorless and tasteless to rats and mice when mixed with foods in the recommended proportion. They do not associate the effect of the poison with the cause. Thus, in the preparation of baits it is well to follow directions and add only the amount of poison as indicated on the package.

A bait material should be not only acceptable to rats and mice and unattractive to humans and domestic animals, but also relatively non-perishable so that it will retain its odor and taste for several weeks. Yellow corn meal probably comes closer to meeting the desired requirements than any other readily available food.

A freshly-ground whole yellow corn is preferred. Freshly-ground corn meal can usually be obtained locally at an elevator or mill that grinds daily. Bread crumbs are also accepted quite well and can be prepared by drying bread in an oven and crumbling it into uniformly fine particles before adding the poison. For mice only, rolled oats or white cake crumbs are good substitutes for corn meal or they can be added to furnish variety to the bait. This bait is also taken fairly well by rats.

The following two bait mixtures are suggested as all-purpose baits for rats and mice:

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|----------------------------------|-------------|--------------------------------|-------------|
| (1) Corn meal ----- | 65% | (2) Corn meal ----- | 45% |
| Rolled or ground oats ----- | 20% | Rolled or ground oats ----- | 45% |
| Powdered sugar ----- | 5% | Vegetable or mineral oil ----- | 5% |
| Vegetable or mineral oil----- | 5% | Warfarin (0.5% concentrate)-- | 5% |
| Warfarin (0.5% concentrate)----- | 5% | | <u>100%</u> |
| | <u>100%</u> | | |

Freshly-ground yellow corn is preferred in the above mixture, but grits or degerminated corn meal, the latter being generally available at grocery stores, can be substituted. Similarly, crude corn or peanut oil is preferred, if obtainable, as it adds considerable flavor and odor to the bait mixture and thus increases acceptance.

Other than the safety feature, there is no reason why perishable foods such as ground meat or fish cannot be used except that they must be replaced daily or every other day, depending upon conditions which cause drying and spoilage. Fresh perishable types upon which rats and mice are accustomed to feed may be used either by mixing warfarin with the food or dusting it on surfaces of bait materials such as lettuce, melons, etc.

Bait Placement

For rat control, place bait at or near places where rats are accustomed to feed. On the farm, two or three one-pound placements in a barn, one or two in a corn crib, and possibly one in each of the other buildings and sheds will suffice. For house mouse control, since mice have a very restricted range from their harboring places it is recommended that small baits (about 2 or 3 ounces) be placed at not more than 12-foot intervals along walls for best acceptance and results. Bait must be available to rats and mice continuously, therefore check the placements daily or at no more than two-day intervals to replenish bait as needed.

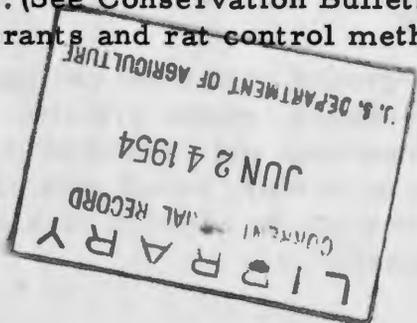
Place bait in shallow pans, preferably not more than one-half inch high. If bait is in a bag, nail one end down and to hasten acceptance make a small cross slit in the bag.

Use of Warfarin in Conjunction with Other Methods

In locations heavily infested with rats and mice, red squill or other poisons may be used to obtain a quick kill, following with warfarin baits to eliminate wary, baitshy individuals. To use red squill, mix the poison with ground meat and ground fish (separately) and expose large teaspoonful baits at intervals along walls and other runways. Calcium cyanide dust will also prove very effective as a preliminary method. Dust the powder, preferably using a foot-pump type duster, in rat runways under concrete floors, in the ground, and other confined places. Follow with exposure of warfarin baits as described above.

Odors

Putrefactive odors may follow the use of warfarin as with other poisons. No poison taken in lethal amounts will cause rats to "dry up" without an odor. The placement of warfarin baits in the basement and not higher than the first floor will help prevent putrefactive odors. (See Conservation Bulletin No. 8 "Rat Control" for further information on deodorants and rat control methods.)



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