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Controlling Insects and Mites on Beef and Dairy Cattle  
Michigan State University  
Cooperative Extension Service  
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# Controlling Insects and Mites IN LIVESTOCK

*This bulletin replaces Extension Bulletins E-467, E-445 and E-448 and supplies information on horses which has not previously been published in bulletin form.*

**Beef Cattle**  
**Dairy Cattle**  
**Horses**  
**Sheep and Goats**  
**Swine**

Cooperative Extension Service • Michigan State University

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Insect and mite pest control programs should be maintained throughout the year. While flying pests are most abundant during the spring, summer and fall, lice and mites infest livestock the year-round. Lice are particularly pestiferous in winter. When livestock are weakened by these pests, production of meat and milk is reduced and the animals are considerably more susceptible to the invasion of secondary organisms causing pneumonia and other disabling diseases. In addition, livestock hides can be damaged directly by pest attack or indirectly as livestock rub against fences, barbed wire or buildings to relieve the irritation.

## WARNINGS\*

All insecticides and miticides are poisonous to man and animals in various degrees. Handle them cautiously so that they will not poison livestock, children or the user. When using insecticides on livestock, use only suggested dosages and measure all materials carefully.

— Do not apply chemicals to livestock closer to slaughter than the time given in this bulletin.

*\*Materials and rates of applications listed in the tables are based on the latest information available at the time this publication went to press. Supplemental information will be disseminated as the need arises, usually through the offices of county agricultural agents. The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no indorsement by the Cooperative Extension Service is implied.*

- Read "Warnings And Use Information" before treating an animal.
- Read the package label for additional instructions on how to use pesticide chemicals safely. Meat and milk can be seized if they contain more insecticide or miticide than allowed by law.
- Do not allow insecticides or miticides to drift onto pastures, hay fields, food crops, wood lots, noncrop areas, lakes or ponds. Certain restrictions placed on chemicals when used on animals or human food crops are listed in this bulletin.

Three general conditions concerning pesticide usage follow:

1. One of the most important sources of meat and milk contamination from pesticides is feed (hay, silage or grain) which contains excessive or unallowable pesticide residues.
2. Little danger exists from excessive residues when approved materials are correctly used. However, to make the approved materials safe, you must carefully observe dosage rates, residues resulting from drift and cut-off dates before harvest of crops fed to livestock.

Abbreviations used in this bulletin are:

WP means Wettable Powder  
EC means Emulsifiable Concentrate, or Emulsion  
LC means Liquid Concentrate  
SC means Suspension Concentrate  
D means Dust  
Tbsp. means tablespoon  
tsp. means teaspoons

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3. When applied to water or wildlife areas, some of the materials listed may kill fish or wildlife. To determine the dangers of drift, read the package label. Follow the same restrictions for insecticide and miticide drift as for direct application of the same materials to food crops. For information on fish and wildlife poisoning from insecticides and miticides applied to water or areas other than crop lands, consult your county agricultural agent.

4. See additional warnings at the end of this bulletin.

## BEEF CATTLE

### Cattle Grubs

These maggots occur in the backs of native (Michigan) cattle from January to June, depending on the species of cattle grub flies. The common cattle grub occurs first, January to March; the northern cattle grub or bomb fly, March to June. Both cause lumps to form along the back. The maggots are spiny, legless and curved-bodied. Until they are mature, cattle grub maggots are white; at maturity they turn brown or black and escape from the backs of the animals. They pupate in the soil and the adults emerge in 4 to 5 weeks. The complete life cycle requires 1 year.

Cattle brought from areas outside Michigan usually need treating at different times than native (Michigan) animals. Use the following information to time cattle grub treatments:

Native cattle – Sept. 15 to Nov. 1

Texas and Southwest – April 1 to July 30

Oklahoma and Kansas – May 1 to Aug. 31

Iowa, Nebraska, Colorado – June 1 to Sept. 30

Dakotas, Wyoming, Montana – July 1 to Oct. 31

Canada – Sept. 1 to Dec. 31

*Do not apply any treatment after the warbles (grubs) appear in the backs of animals.* In cattle brought from various regions, first warbles usually occur in the backs of the animals as follows:

Michigan – Jan. 1 to June

Canada – April or earlier

Dakotas, Wyoming, Montana – January

Iowa, Nebraska, Colorado – December

Oklahoma and Kansas – November

Texas and Southwest – October

*Note* – The appearance and length of time grubs stay in the backs of animals varies with the season, location and species. Generally, the common cattle grub occurs first and the northern cattle grub, or bomb fly, last. For control of grubs in Michigan cattle do not apply spray, pour-on or dip treatments before Sept. 15 or after Nov. 1. *Do not apply a chemical when warbles are in the backs of the animals.*

### Other Flies

**Horse and Deer Flies** are large, ranging from about 1/3 to 1 inch long; usually brown with brilliantly colored eyes. The smaller kinds have brown-banded wings. The females cut the skin with knife-like mouth parts and feed on the blood. Heavy adult feeding can weaken animals by excessive loss of blood and a disruption in normal animal habits often reducing feeding. Males do not feed on blood.

The maggots of horse and deer flies live in the mud on the bottom of shallow lakes, ponds and swampy areas. Hence, these flies will be worse in the vicinity of those types of water areas.

**The Stable Fly** is 1/4 inch long and grayish in color. It differs from the house fly in having seven rounded dark spots on top of the abdomen and mouth parts formed into a piercing and sucking beak. Both males and females live on blood. Eggs are laid in manure and decaying vegetation. When not on cattle, the stable fly rests in the shade on wooden posts, trees and buildings. The stable fly prefers to attack active animals. The ears and legs of cattle are the parts most often fed on.

**Face Flies** resemble the house fly, but are darker and slightly larger. Females have a grayish-green abdomen and are hard to tell from house flies. Males have abdomens with a black line down the center and eyes that almost touch. The males feed on nectar and pollen and are not found on animals. Female face flies feed on animal secretions around the eyes, the lips and in and around the nostrils – hence, their name. This feeding habit is believed to be a major contributor in the spread of eye diseases. Larvae feed in fresh cow dung and possibly in other kinds of excrement.

**Horn Flies** are grayish-black and about one-half the size of the house fly. They have sucking mouth parts and remain constantly on the cattle. Horn flies feed primarily on the withers, around the horns and along the back. During hot weather or rains, the flies may move to the belly and on cool nights may cluster between the hind legs.

These pests lay their eggs in fresh manure where the maggots feed. The eggs hatch in about 20 hours and maggots develop for about 5 days before pupating. At the end of a 5-day pupation period, they emerge as adult flies.

**Note:** If back rubbers are used in conjunction with a good year-round pest control program, they will help control horn flies and possibly other pests. Placement of back rubbers is most important. Force the animals to use them by placing them near feed supplements, water or along a fenced run under which the animals must pass to get from one area to another.

## Sarcoptic Mange

This trouble is caused by a very small, somewhat hemispherically shaped mite. It bores into the skin, causing it to be rough and scabby. The damage done by the mite may result in thinning of the hair.

## Cattle Lice

Three important lice infest cattle. One is the red chewing louse, which is 1/12 inch long when mature. The eggs are colorless when first laid but later turn very light brown. The short-nosed cattle louse is 1/8 inch long, slate-gray, wingless and has a short pointed head. It has sucking mouth parts and feeds by sucking blood. The eggs are white and attached to the hair. The long-nosed cattle louse is 1/10 inch long, blue, wingless and has a long pointed head. Its eggs are black.

Lice are most bothersome in the winter. Hence, a treatment applied in late fall (before cold weather) checks an increase in their numbers and delays damage to animals until later in the winter. Treating twice (14 days apart) with a suitable insecticide will normally eliminate lice from a herd, provided newly purchased animals are isolated and treated before being turned in with other cattle. Apply any treatment thoroughly.

The proper times to apply treatments for cattle grubs and cattle lice are not necessarily compatible. For example, cattle grub systemic treatments for native Michigan cattle must be applied no later than Nov. 1. The best time to apply treatments for cattle lice would be after Nov. 1 date for cattle grubs. December treatments for lice are usually better than

those applied in September, October or even November.

## Fly Control in Barns

For successful fly control, organize a control program which includes a combination of insecticide formulations such as baits, residual sprays, larvicides, barn atomizers, etc., during the fly season. Do **not** wait for heavy fly populations. As fly populations begin to build-up, take time to treat.

**Treat regularly.**

## SANITATION

- Clean the manure from livestock pens as frequently as possible.
- Spread the manure thinly outdoors in order that fly eggs and larvae can be killed by drying.
- Eliminate silage seepage areas, wet litter, manure stacks, bales of old wet hay or straw and other organic matter accumulations.
- Provide proper drainage in barnyards with gravel and other fill to eliminate low spots in cattle yards.

## SPRAYS

Barn surfaces vary in the amount of spray that can be applied to them. For example, smooth surfaces take less, rough ones more. The instructions for each insecticide are a guide to how much to apply. However, no more gallons of spray than given in the tables should be used to 1,000 square feet of barn surface.

Add **one** of the following insecticides to water as indicated:

**Table 1. — Insecticide Materials for Spray Application**

Chemical	Amount per 1,000 sq. ft.	Comments and Warnings
Diazinon, 1% in water spray.	1 to 2 gals.	Mix 4 lbs. of 50% WP or ½ gal. 47.5% EC in 25 gals. of water. Apply to walls, ceilings, etc. Do not contaminate milk or milking equipment. <u>Do not use in dairy barns or milkrooms.</u>
Dimethoate, 1% in water spray.	1 gal.	Mix 1 gal. of 23.4% EC in 25 gals. of water. Apply thoroughly as a surface spray to interior and exterior surfaces. Remove animals before spraying. Do not contaminate milk or milking equipment.
Fenthion (Baytex), 1.25% in water spray.	2 gals.	Mix 2 pints 93% LC in 25 gals. of water. Apply thoroughly to walls, ceilings, etc. Do not apply directly to animals. Do not use as a space spray. Do not contaminate milk or milking equipment.
Malathion, 1% in water spray.	1 to 2 gals.	Mix 8 lbs. of 25% WP or 2 quarts of 57% EC in 25 gals. of water. Apply thoroughly to walls, ceilings, etc. Do not contaminate milk or milking equipment.
Rabon, 1% in water spray.	1 gal.	Mix 4 lbs. 50% WP in 25 gals. of water. Spray walls, ceiling, etc. thoroughly. Do not contaminate milk or milking equipment.
Ronnel (Korlan), 1% in water spray.	1 to 2 gals.	Mix 1 gal. 24% EC in 25 gals. of water. Apply to walls, ceiling, etc. Do not contaminate milk or milking equipment.

## BAITS

Apply baits to clean concrete or areas where flies gather. These places are usually sunlit. Baits can be used alone, but should be used in conjunction with wall and ceiling sprays.

Use one of the following dry or wet baits:

**DRY BAITS** – Use 1% ronnel (Korlan) or dichlorvos; or 1 to 2% Diazinon; or 1% trichlorfon (Dipterex, Dylox, Neguvon); or 3 1/2% malathion; or 1/2% naled (Dibrom). Follow manufacturer's label directions carefully. **Do not use Diazinon in dairy barns or milkrooms.**

**WET BAITS** – (1) Add 1/2 pint of a malathion 57% EC plus 1 cup of sugar syrup to 3 gallons of water. Apply with a sprinkling can or other suitable equipment. (2) Use 1/10% trichlorfon (Dipterex, Dylox, Neguvon); or 1/2% dichlorvos; or 2% ronnel (Korlan) liquid bait. Follow label directions carefully.

### Warnings

- Do not apply baits where animals can slip and fall.
- Keep baits away from areas where children play.

## BARN ATOMIZERS

Space sprays or aerosols containing 0.1% pyrethrins and 1% piperonyl butoxide (1/2 fluid ounce per 1,000 cubic feet) will give satisfactory knock-down and kill of flies. A 1% dichlorvos (Vapona) insecticide applied as a fog or mist is effective. One pint of a 1% solution will treat 8,000 cubic feet (40 x 20 x 10). Do not use this fogging solution in areas where animals have received a direct application within the previous 8 hours. Avoid contamination of milk and milk utensils. Daily use of atomizers or foggers is necessary when they are used alone. Read the label for mixing instructions.

## FLY MAGGOTS IN MANURE

Treat manure or manure piles with one of the following insecticides mixed in 25 gallons of water:

**Dimethoate** – 1 gallon of an emulsion containing 2 pounds of chemical per gallon.

**Malathion** – 3 pints of an emulsion containing 5 pounds of chemical per gallon or 8 pounds of 25% wettable powder.

**Rabon** – 4 pounds of 50% wettable powder.

**Ronnel (Korlan)** – 1 gallon of an emulsion containing 2 pounds of active ingredient per gallon.

Wet the surface of the manure. It is not necessary to soak it. Repeat as needed.

### Warnings:

Do not apply dimethoate, malathion, ronnel or Rabon to livestock unless the package label or Michigan State University literature gives instructions to do so. Chemically treated manure should not be applied to any areas in which vegetables are grown, unless specific materials are approved for such vegetables.

## SPRAYS FOR FEED LOTS

Regular removal of manure from these areas is absolutely required for fly control. For sprays around fences, over manure piles and inside walls of loafing pens, use Rabon or ronnel as given for treating inside walls and ceilings of barns.

### Warnings

Do not spray the animals directly with these materials unless other sections of this bulletin give approval.

Avoid treating cattle resting areas. Keep these clean and well bedded.

## SPRAY FOR OUTSIDE BARN

Use dimethoate, malathion, Diazinon, ronnel, Rabon or Fenthion as given for treating inside walls and ceilings of barns. Follow carefully all label instructions for use outside dairy barns. In particular, do not apply to water and feed crops. **Do not use Diazinon in dairy barns or milkrooms.**

**Follow label directions and precautions.**

**See Last Section for Warnings about the Insecticides Before Use – Read the Label.**

**Table 2. — Insect and Mite Control Program for Beef Cattle**

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
CATTLE GRUB	coumaphos (Co-Ral), water spray, 0.375 to 0.5%.	0	Depends on animal size and hair coat	Use 12 to 16 lb. of Co-Ral 25% WP per 100 gals. of water. Follow label directions and precautions. Spray thoroughly.
	famphur (Warbex), pour-on (13.2%)	35	½ oz. per 100 lbs. body weight. Up to a maximum of 4 oz. per animal	This ready-to-use formulation requires no mixing. Do not repeat treatment. Do not use on Brahman cattle.
	ronnel (Korlan), 0.26% in feed. (Use in purified grade only)	28	0.3 lb. per 100 lbs. body weight per day.	Feed daily for 14 days. Follow label directions and precautions. Mix with feed (grain or protein supplement).
	ronnel (Korlan), 5.5% block, or granules.	21	0.25 lb. per 100 lbs. body weight per month.	Feed free-choice continuously for not less than 75 days. If feeding ronnel, do not spray, dip, or pour-on ronnel, coumaphos, Ruelene, or Trichlorfon. Follow label directions and precautions.
	ronnel (Trolene FM), up to 6% in minerals mixed in feed	60	0.0018 lb. ronnel per 100 lbs. body weight per day.	Feed daily for 7 days. Follow label directions and precautions. Mix with feed (grain or protein supplement).
	Ruelene, pour-on 25E.	28	1 fl. oz. per 100 lbs. body weight up to 800 lbs. Use no more than 8 fl. oz. per animal.	Dilute ½ gal. of 25% Ruelene emulsifiable concentrate with 1½ gals. of water. Follow label directions and precautions. Pour evenly along the back line with a marked dipper.
	Ruelene 8R, pour-on.	28	¾ fl. oz. per 100 lbs. body weight up to 800 lbs. Use no more than 8 fl. oz. per animal.	This ready-to-use Ruelene requires no mixing. Do not treat more often than once every 28 days. Pour evenly along the back-line with a marked dipper.
	trichlorfon (Neguvon, Dipterex, Dylox), pour-on 8%.	21	½ fl. oz. per 100 lbs. body weight. Use no more than 4 fl. oz. per animal.	Follow label directions and precautions. Pour evenly along the back-line with a marked dipper.
trichlorfon (Neguvon, Dipterex, Dylox), 1% in water spray.	14	Apply solution for complete wetting to run-off.	A single application is adequate. Mix 10 lbs. of Neguvon 80 SP per 100 gals. of water. Spray thoroughly.	
FACE FLY	Ciovap (1% Ciodrin and ¼% dichlorvos). (Use as bought).	0	1 gal. of solution per 20 ft. cable.	Use a backrubber, or apply spray to the back and especially to the face. Saturate backrubber. Do not treat animals under 6 months of age.
	Ciovap EC (10% and 2.5% dichlorvos), 1% in water spray.	0	5 tsps. to the face and a total of 5 to 10 tsps. to the back and sides of the animals.	Mix 4 Tbsps. Ciovap EC (1.1 lb. per gal.) in 1½ pints of water. Do not apply more often than 3 times per week.
	coumaphos (Co-Ral), 1% in oil.	0	1 gal. of solution per 20 ft. cable.	Use a back rubber. Saturate backrubber.

Table 2. — Beef Cattle (continued)

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
HORN FLY	Ciovap (1% Ciodrin and $\frac{1}{4}$ % dichlorvos). (Use as bought).	0	1 gal. of solution per 20 ft. cable.	Use in a backrubber or apply as a fine mist to cover entire animal.
	Ciovap EC (10% Ciodrin and 2.5% dichlorvos), 1% in water spray.	0	1 to 2 pints	Mix 2 quarts of Ciovap EC (1.1 lbs. per gal.) per 6 gals. of water. Do not apply more often than once every 7 days. Spray thoroughly.
	Ciodrin, 3% dust. (Use as bought)	0	2 Tbsps.	Sprinkle on poll, back and sides or use dust bags. Do not apply dust more often than once every 14 days. Do not treat calves under 6 months of age. Do not treat Brahman cattle.
	coumaphos (Co-Ral), 1% in oil.	0	1 gal. of solution per 20 ft. cable	Use in a backrubber.
	coumaphos (Co-Ral), 0.06% in water spray.	0	1 or 2 quarts	Mix 2 lbs. of Co-Ral 25% WP in 100 gals. of water, or 2 quarts of 11.6% Co-Ral EC in 100 gals. of water. Apply every 3 weeks, or as needed. Do not spray animals less than 3 months old. Do not apply to lactating dairy animals, or to dry animals within 14 days of freshening. Spray on back.
	malathion, $\frac{1}{2}$ % in water spray.	0	2 quarts	Mix 7 pints of malathion 57% EC or 16 lbs. of malathion 25% WP per 100 gallons of water. Apply every 2 weeks if needed. Spray on back and neck.
	methoxychlor, 5% in oil.	0	1 gal. of solution per 20 ft. cable	Dilute 1 gal. methoxychlor 24% EC with 4 gals. of diesel fuel, or similar oil. Do not use in sprays or dips for dairy cattle. Saturate backrubber.
	methoxychlor, $\frac{1}{2}$ % in water spray.	0	2 quarts	Mix 1 quart of methoxychlor 24% EC to 12 $\frac{1}{2}$ gals. of water. Apply every 3 weeks, or as needed. Spray back.
	ronnel (Korlan), 1% in oil.	14	1 gal. solution per 20 ft. cable	Mix 1 gal. of Korlan 24% EC with 27 gals. of diesel, or similar oil. (Do not use motor oil). Do not apply to lactating dairy animals, or to dry dairy animals within 21 days of freshening. Saturate backrubber.
STABLE FLY	toxaphene, 5% in oil.	28	1 gal. solution per 20 ft. cable	Ready-to-use dilute solution. Do not use on animals less than 3 months old. Saturate backrubber.
	toxaphene, $\frac{1}{2}$ % in water spray.	28	2 quarts	Mix 1 gal. of toxaphene 59% EC (6 lbs. per gal.) in 150 gals. or 5 pints 59% EC in 100 gals. of water. Apply every 3 weeks or as needed. Spray back.
	Ciovap (1% Ciodrin and $\frac{1}{4}$ % dichlorvos). (Use as bought).	0	2 fl. oz.	Mist spray to all parts of body and legs, especially to forehead.
	Ciodrin, 3% dust. (Use as bought).	0	2 Tbsps.	Do not apply dust more often than once every 3 weeks. Do not treat calves under 6 months of age. Sprinkle on poll, back and sides or use dust bags. Do not use on Brahman cattle.
	Synergized Pyrethrins (0.1% pyrethrins +1% synergist)	0	1 to 2 fl. oz.	Mist spray.

Table 2. — Beef Cattle (continued)

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
HORSE FLY, DEER FLY	Synergized Pyrethrins. (0.1% pyrethrins +1% synergist)	0	1 fl. oz.	Use according to label. Apply as a mist spray to all parts of the body, especially the back.
	pyrethrins, 0.75% dust.	0	1 Tbsp.	Dust thoroughly. Repeat after 2 or 3 weeks. Sprinkle on poll, back and sides or use dust bags.
LICE	Ciovap (1% Ciodrin and $\frac{1}{4}$ % dichlorvos). (Use as bought); or coumaphos (Co-Ral) 1% in oil; or methoxychlor 5% in oil; or ronnel (Korlan) 1% in oil; or toxaphene 5% in oil.	Same as for Horn Fly		Use a backrubber.
	Ciodrin, 3% dust. (Use as bought).	0	2 Tbsp.	Do not apply dust more than once every 3 weeks. Do not treat calves under 6 months of age. Sprinkle on poll, back and sides or use dust bags. Do not treat Brahman cattle.
	coumaphos (Co-Ral), 0.06% in water spray.	0	Depends on animal size and hair coat.	Mix 2 lbs. of Co-Ral 25% WP, or 4 quarts of 11.6% Co-Ral EC in 100 gals. of water. Do not treat animals less than 3 months old. Spray animals 3 to 6 months old lightly. Spray thoroughly.
	malathion, $\frac{1}{2}$ % in water spray.	0	Depends on animal size and hair coat.	Mix 3.5 quarts of malathion 57% EC, 16 lbs. malathion 25% WP, or 8 lbs. malathion 50% WP per 100 gals. of water. Do not use on calves less than one month old. Never treat lactating dairy animals within 14 days of freshening. Spray thoroughly.
	methoxychlor, $\frac{1}{2}$ % in water spray.	0	Depends on animal size and hair coat.	Mix 2 gals. of 24% methoxychlor EC in 100 gals. of water. Repeat treatment in 2 or 3 weeks, if needed. Spray thoroughly.
	malathion, $\frac{1}{2}$ % in water spray.	0	Depends on animal size and hair coat.	Do not treat animals less than one month old. Do not treat lactating dairy animals or dry animals within 14 days of freshening.
	ronnel (Korlan), $\frac{1}{4}$ % in water spray.	56	Depends on animal size and hair coat.	Mix ronnel (Korlan) 8 lbs. of 25% WP, or 1 gal. 24% EC per 100 gals. of water. Do not reapply sprays within 2 weeks. Do not use on dry dairy animals within 21 days of freshening. Spray thoroughly.
	toxaphene, $\frac{1}{2}$ % in water spray.	28	Depends on animal size and hair coat.	Mix 1 gal. of toxaphene 59% EC (6 lbs. per gal.) in 150 gals. or 5 pints 59% EC in 100 gals. of water. Repeat treatment 2 to 3 weeks, if needed. Do not spray dairy animals or calves less than 3 months old. Spray thoroughly.

## CONTROL OF FLIES IN MILKROOMS

Extremely small amounts of pesticides can be detected in milk. Their presence is illegal. Special attention should be made to prevent contamination of milk, milk utensils and containers.

The following insecticides are suggested for the milkroom, if used according to label instructions and precautions:

dichlorvos (Vapona) 1% dry or 0.1% liquid sugar bait, naled (Dibrom) 1/2% liquid or dry baits, ron-

nel (Korlan) 2.0% liquid bait and malathion 1.0% bait spray, trichorfon (Dipterex) 1% bait, pyrethrin, 0.3% water spray or 0.6% aerosol formulation plus piperonyl butoxide 3.0% water spray or 6.0% aerosol formulation.

To keep residues out of milk, avoid on-the-farm use of chlorinated hydrocarbon insecticides, such as DDT, endrin, heptachlor, lindane, toxaphene, etc.

**Read the label before using any pesticide.**

**Table 3. — Insect and Mite Control Program for Dairy Cattle**

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
CATTLE GRUB	In the past, rotenone has been registered for grub control on dairy cattle; however, at the present time, neither this, nor any other chemical, is registered for this purpose.			
FACE FLY	Ciovap (1% Ciodrin and 1/4% dichlorvos). (Use as bought).	0	2 fl. oz.	This ready-to-use spray requires no mixing. Do not exceed 2 fl. ozs. daily. Do not contaminate food, feed, or drinking water. Apply as a mist especially to the forehead. Do not wet the skin. Do not apply to animals under 6 months old. READ THE LABEL.
	Ciovap EC (10% Ciodrin and 2.5% dichlorvos), 1% in water spray.	0	5 to 10 tsps.	Mix 4 Tbsps. of Ciovap EC (1.1 lbs. per gal.) in 1 1/2 pints of water and apply 5 tsps. to the face and a total of 5 to 10 tsps. to the back and sides of the animals. Do not apply more often than 3 times per week. READ THE LABEL.
	dichlorvos (Vapona), 1% in water spray.	0	1 to 2 fl. oz.	Dilute 1 quart of Vapona 21.8% EC (2 lbs. per gal.) with 6 gals. of water. Do not apply in excess of 2 fl. oz. per animal per day. Apply daily with hand or automatic sprayer. Do not wet the skin. Apply as a mist especially to forehead. READ THE LABEL.
HORN FLY	Ciovap (1% Ciodrin and 1/4% dichlorvos). (Use as bought).	0	1 gal. of solution per 20 ft. cable.	No mixing required. Do not allow animals to straddle backruber. READ THE LABEL.
	Ciodrin 3% dust (Use as bought).	0	1 to 2 Tbsps.	Do not apply dust more often than once every 14 days. Do not treat calves under 6 months of age. Sprinkle on poll, back, sides or use dust bags. Do not apply to Brahman cattle. READ THE LABEL.
	Ciovap (1% Ciodrin and 1/4% dichlorvos). (Use as bought).	0	2 fl. oz.	This ready-to-use spray requires no mixing. Do not exceed 2 fl. oz. daily per animal. Do not wet skin. Do not apply to calves under 6 months of age. Apply as mist spray to all parts of body including legs. READ THE LABEL.
	coumaphos (Co-Ral), 1% in oil.	0	1 gal. of solution per 20 ft. cable	Mix 4 quarts Co-Ral 11.6% EC in 13 gals. of No. 2 fuel oil, or No. 2 diesel fuel oil. Place backrubbers where animals travel regularly. Do not allow animals to straddle backruber. READ THE LABEL.
	malathion 5% dust. (Use as bought).	0	3 Tbsps.	Apply dust at least 5 hours before milking. Never apply during milking. Do not repeat application more often than once every 2 weeks. Sprinkle on back and neck. READ THE LABEL.

Table 3. — Dairy Cattle (continued)

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
	methoxychlor, 50% WP. (Use as bought)	0	1 Tbsp. per animal.	Apply dry powder to back and neck of each animal. Rub powder into hair with the hand. Repeat every 3 weeks if necessary.
	pyrethrins, 0.1% in oil or EC, with 1% synergist	0	1 fl. oz.	Apply as a mist spray. Use daily in hand sprayers, microsols, foggers, automatic sprayers, or back-rubbers. Synergists such as piperonyl butoxide are recommended. Follow label instructions.
	pyrethrins, 0.75% dust	0	1 Tbsp.	Dust thoroughly. Repeat after 2 to 3 weeks. Sprinkle on poll, back, sides or use dust bags.
HORSE FLY, DEER FLY	pyrethrins, 0.1% in oil or EC, with 1% synergist.	0	1 to 2 fl. oz.	Apply daily with hand or automatic sprayer. Use same synergist as for horn fly. Follow label instructions. Apply as a mist - especially to the back.
	pyrethrins, 0.75% dust	0	1 Tbsp.	Dust thoroughly. Repeat after 2 to 3 weeks. Sprinkle on poll, back and sides or use dust bags.
LICE	Ciovap EC (10% Ciodrin and 2.5% dichlorvos), 1% in water spray.	0	Depends on animal size and hair coat.	Spray animals thoroughly. A second application may be required in 14 days. Do not spray more often than once every 7 days. READ THE LABEL.
	Ciodrin, 3% dust. (Use as bought).	0	2 Tbsp.	If required, repeat thorough application in 3 to 4 weeks. Do not treat calves under 6 months of age. Treat thoroughly. Do not apply to Brahman cattle. READ THE LABEL.
	coumaphos (Coral), 1% in oil.	Same as for Horn Fly in Dairy Section.		Use backrubbers.
STABLE FLY	Ciovap (1% Ciodrin and $\frac{1}{4}$ % dichlorvos). (Use as bought).	Same as for Face Fly in Dairy Section.		Apply as a mist spray.
	pyrethrins, 0.1% in oil or EC, with 1% synergist.	Same as for Horse Fly in Dairy Section.		Apply as a mist spray.
	pyrethrins, 0.75% dust	0	1 Tbsp.	Dust thoroughly. Repeat after 2 to 3 weeks. Sprinkle on poll, back and sides or use dust bags.

## HORSES

A number of different flies attack horses, mules, donkeys and ponies. The most bothersome are horse flies, stable flies, black flies, house flies and bot flies.

### HORSE FLIES

Horse flies pass through the winter as nearly full grown larvae in the mud around lakes or water holes. They are pointed at both ends, whitish or banded with black or brown and have a fleshy ring on each body segment. They become full grown in the spring, when they pass through the pupal stage. The flies begin to appear in early summer. The females cut through the skin of the animals with knife-like mouthparts and feed on the blood for several minutes. Eggs are laid on leaves or stems of plants near moist locations. See Beef Cattle section for additional information.

The other flies, except for bot flies, are described in previous sections.

### HORSE BOTS

Three kinds of bot flies are pests of horses. The common bot fly and the throat bot fly occur in northwestern and midwestern states. The third is the nose bot fly. Adult bot flies do not feed. Their sole purpose in life is to reproduce. They live from a few days to three weeks. They begin to appear in June and live until there is a heavy freeze. Eggs usually can be found on horses as soon as flies are seen.

Egg laying continues as long as adults are present.

The larval stages of the bot flies develop in the digestive tract and pass out at maturity (by October). The mature bots then burrow into the soil to pupate and later emerge as adult flies.

The largest of the three species, the common bot fly, is about the size of a honey bee. The body is covered with black and yellow hairs. The female deposits her eggs on the forelegs of the horse or occasionally on the mane, belly, neck and flanks. The throat bot female deposits her eggs on hair under the horses jaws. The nose bot deposits her eggs on hair near the lips.

### LICE

Horses and other equines are attacked by two kinds of lice — a biting louse and a sucking louse. Life cycles of these lice are similar to those explained in the Beef Cattle section. The coat about the head, withers and base of the tail becomes unkempt and full of scurf. Parts of the body may be rubbed raw because of the irritation.

### MANGE

Mange is caused by a small oval mite. These mites burrow beneath the skin and lay their eggs in the burrow. Excretions and the tunneling cause extreme pain and the animals rub the area until it is raw. The trouble is most evident in winter.

Table 4. — Insect and Mite Control Program for Horses

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
FLIES	pyrethrins, 0.1% in oil or EC, with 1% synergist.	0	1 fl. oz.	Apply as a mist spray. Follow label directions.
	malathion, $\frac{1}{2}\%$ in water spray.	0	Depends on animal size and hair coat.	Mix $3\frac{1}{2}$ quarts 57% EC or 16 lbs. 25% WP in 100 gals. of water. Apply on back and neck of animals. Repeat in about 10 to 14 days. READ THE LABEL.
HORSE BOTS	Trichlorfon (Anthon)	0	1 packet (5 grams) per 250 lbs. body weight.	Apply after killing frost. Repeat after 3 to 4 months, but never more frequently than every 30 days. Do not treat colts under 4 months old, or mares in the last month of pregnancy. Single dose orally in feed. Feed additive.
LICE	malathion, $\frac{1}{2}\%$ in water spray.	Same as for flies (above)		

Note: For the control of flies in horse barns and other areas, refer to the various fly control in the beef cattle section. READ THE LABEL BEFORE APPLYING ANY PESTICIDES.

# SHEEP AND GOATS

## Lice

All stages of the biting louse, the blood sucking body louse and the foot louse live on the animals. Eggs are attached to the hairs, but can hatch even after being dislodged from the animals for several weeks. Immature and adult lice can survive for a week off the host.

### BITING OR RED CHEWING LOUSE

It is 1/20 inch long with a light brown body. The head is reddish and broadly rounded in front. Each segment of the abdomen has one row of hairs running across it. It crawls about chewing wool fibers and skin scales, causing irritation to the animal and damage to the wool.

### BLOOD SUCKING BODY LICE

This pest infests the entire body and face next to the skin, often clustering in large groups. It closely resembles the blood sucking foot louse, but is more slender and the head is twice as long as broad. It is up to 1/12 inch long and dark-gray or bluish in color. The blood sucking body louse injures sheep mainly by sucking blood.

### BLOOD SUCKING FOOT LICE

It is about 1/12 inch long and dark-gray or bluish in color. The head is about as long as wide. Each segment of the abdomen has two rows of hairs running across it. The foot louse is found on the legs in the short hairs below the true wool. Generally, it is not so damaging to sheep as the blood sucking body louse or the red chewing louse.

Five lice infest goats and can be controlled as suggested for sheep lice.

## Flies

For description of face and stable flies, see Beef Cattle section.

### SHEEP TICK OR KED

This wingless fly is brown, 1/4 inch long and has 6 legs. The abdomen is sac-like; and the mouth parts

are of the sucking type. Its food is blood and lymph taken from sheep and occasionally from goats. The insect stains the wool and robs animals of nutrition.

Sheep keds usually spend their entire lives on the animals except when accidentally dislodged. However, they crawl readily from ewes to lambs. The females give birth to living young (maggots) which are attached immediately to hairs, mainly on the belly and neck. Immature maggots are 1/8 inch long, whitish, oval and without legs. Within 24 hours, the skin of the maggots turn brown, forming pupal cases. The adult keds "hatch" from the pupal case in 3 to 5 weeks, depending on the temperature, since more time is needed to change from maggots to the adults in winter.

## FLEECE WORMS

These worms may be one or more of several fly maggots, but usually the green and bluebottle flies (blow flies) are responsible. The maggots have blunt tails and pointed heads. They live in matted and soiled wool. They often occur in open wounds.

## Mites

### SHEEP SCAB OR SCABIES

This trouble is caused by a mite. It is white or yellowish and very small — barely visible to the unaided eye. It pierces the skin with very sharp mouth parts, causing inflammation and itching. Scabs form over the mites where blood and serum ooze from the wounds.

Scabs form over the mites where blood and serum ooze from the wounds made by these pests.

Sheep infested with scabies are subject to State and Federal quarantine. Consequently, all known or suspected sheep must be reported to the State Veterinarian's Office. When reporting, you may ask the help of your county agricultural agent, your local veterinarian, or the Animal Husbandry Department, Michigan State University, East Lansing, Michigan.

#### Warning:

None of the materials suggested in this bulletin for control of keds, lice, stable fly and fleece worms (blow flies) can be used for scabies unless approved by the State of Michigan Veterinarian's Office.

Table 5. — Insect and Mite Control Program for Sheep and Goats

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
General warning: Do not use oil-base emulsion on sheep; oil types tend to stain the wool and do not penetrate it as well as others.				
LICE  (Dipping is the most reliable method of eliminating the 3 kinds of lice.)	Ciovap EC (10% Ciodrin and 2.5% dichlorvos), $\frac{1}{4}\%$ in water spray.  Use in water sprays, coumaphos (Co-Ral) $\frac{1}{4}\%$ ; or diazinon 0.06%; or lindane 0.06%; or malathion $\frac{1}{2}\%$ ; or ronnel (Korlan) $\frac{1}{4}\%$ ; or toxaphene $\frac{1}{2}\%$ .	0  Same as for Ticks (keds).	Depends on size of animals and length of wool or hair.	Mix $2\frac{1}{2}$ pints of Ciovap EC in 16 gals. of water. Spray animals thoroughly. Repeat as necessary but not more often than once in 7 days.  Use Diazinon on <u>sheep only</u> .
SCAB (SCABIES) (mange mites)	Sheep scab is a reportable disease subject to State and Federal quarantine and control operations must be supervised by personnel of the State Veterinarian's Office. Rigid regulations against importation of this disease are in effect. If you suspect scab, ask for help from your County Agricultural Agent.			
SHEEP BOT FLY	Ruelene (Rulax), 21% EC	14	2 cc of 21% EC per 10 lbs. body weight.	Do not drench lambs under 30 lbs. body weight. Do not treat sick or overheated sheep, or those being fed in confinement. Do not treat within 1 month of lambing or kidding.
TICKS, (Keds) STABLE FLIES	coumaphos (Co-Ral), $\frac{1}{4}\%$ in water spray.	15	Depends on animal size and wool or hair length.	Mix 8 lbs. Co-Ral 25% WP in 100 gals. of water. Do not treat animals less than 3 months old. Spray thoroughly.
	coumaphos (Co-Ral), 0.5% dust. (Use as bought).	15	1 to 2 oz. per sheep	Dust treatment recommended in cold weather. Follow label directions. Use a hand duster.
	diazinon, (Sheep only). 0.06% in water spray.	14	Use about 1 quart per animal.	Mix 1 lb. diazinon 50% WP per 100 gals. of water. Spray thoroughly. Use low pressure sprayer.
	diazinon, (Sheep only). 2% dust.	14	$1\frac{1}{2}$ oz. per animal.	Dust treatment recommended in cold weather. Follow label directions. Use a hand duster.
	lindane, 0.06% in water spray.	30	Depends on animal size and wool or hair length.	Mix 1 quart of lindane 20% EC, or use 2 lbs. of lindane 25% WP in 100 gals. of water. A second spray application 2 to 3 weeks later may be necessary. Spray thoroughly.
		60		Applied as a dip.
	malathion, $\frac{1}{2}\%$ in water spray.	0	2 to 4 quarts after shearing.	Mix 1 gallon of malathion 57% EC or 16 lbs. of malathion 25% WP per 100 gals. of water. Repeat application after 2 or 3 weeks, if needed. Spray thoroughly. Do not apply to milk goats.
	ronnel (Korlan), $\frac{1}{4}\%$ in water spray.	84 (12 weeks)	1 quart	Mix 1 gallon of Korlan 24% EC in 100 gals. of water. Do not apply more frequently than once every 2 weeks. Dip is also permitted.
toxaphene, $\frac{1}{2}\%$ in water spray.	28	Depends on animal size and wool or hair length.	Mix 3 quarts of 60% emulsifiable toxaphene in 100 gals. of water. Hold the animal in the vat at least 30 seconds and completely immerse twice. Keep the dipping solution clean. Use as a dip. Do not use on dairy goats.	

**Table 5. — Sheep and Goats (continued)**

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
	coumaphos (Co-Ral), $\frac{1}{4}\%$ in water spray.	15	2 quarts	Mix 8 lbs. of Co-Ral 25% WP per 100 gals. of water. Spray thoroughly.
WOOL MAGGOTS (fleece worms)	ronnel (Korlan), $\frac{1}{2}\%$ in water spray.	84	Depends on animal size and wool or hair coat.	Mix 2 gals. of Korlan 24% EC per 100 gals. of water. Repeat if necessary but not more often than once every 2 weeks. Spray thoroughly.
	ronnel (Korlan), 2.5% aerosol bomb.	21	Depends on the amount of wool or hair coat area infested.	Apply directly to all open or fresh wounds such as de-horning, castration, shear cuts, etc. Spray infested area and 3 inches around wound.
	toxaphene, $\frac{1}{2}\%$ in water spray.	Same as for Ticks (keds)		Apply as a dip.
FACE FLY	pyrethrum oil solution 0.1% plus 1.0% synergist.	0	1 to 2 fl. oz.	Apply daily as a mist (in the morning). Do not wet hair or skin. Apply to head, neck and front legs.

WARNING: Avoid dumping dipping vat or spray solutions into or near ponds, wells, or streams. Malpractices have resulted in large fish kills and severe fines to the offender.

## SWINE

### Hog Louse

The hog louse is dull gray-brown and  $\frac{1}{4}$  inch long. It pierces the hog's hide, removing blood through tubelike mouth parts.

Hog lice live in colonies. During cold weather they are found mainly inside the legs and ears, and in folds of the skin of the neck. But any part of the animal's body which offers protection may harbor the pest.

Eggs are laid throughout the winter and are attached to the hairs close to the skin. During the winter, the eggs take about 2 to 3 weeks to hatch, and the immature stage lasts 2 weeks. Immature stages and adults live entirely on the animals, except when they fall off accidentally.

### Sarcoptic Mange or Itch Mite

Sarcoptic mange or itch is caused by a small ( $\frac{1}{50}$  inch long) white or yellow mite that bores into the hide. An animal having sarcoptic mange is unthrifty; its hide is rough and scaly, its hair stands erect, and

it rubs against objects such as fence posts and corners of buildings.

The areas around the eyes, ears, along the back and neck are most often affected. These places may be inflamed, scabby and covered with pimples. The problem usually occurs in the fall, winter and spring.

The mange mite bores into the skin. Slender winding tunnels of nearly 1 inch in length occur throughout the infested part of the body. Eggs are laid in the tunnels and hatch in 3 to 10 days. Under favorable conditions, the mites can complete a generation (brood) in 2 weeks.

Sarcoptic mange is highly contagious. The mites and their eggs can live in bedding and other places for weeks without food, making infestation or reinfestation of healthy animals easy. Report all mange infestations to the State Veterinarian's Office.

### Flies

For description of stable, horse and deer, and black flies see Beef Cattle section.

Table 6. — Insect and Mite Control Program for Swine

Pest	Material and Formulation	Min. Days from Last Appl. to Slaughter	Amount per Animal or Area, if Appropriate	Comments
LICE	coumaphos (Co-Ral), $\frac{1}{4}\%$ in water spray.	0	Depends on animal size and hair coat.	Mix 2 lbs. of Co-Ral 25% WP in 25 gals. of water. Repeat as necessary. Spray thoroughly and apply for complete wetting to run-off.
	Ciovap EC (10% Ciodrin and 2.5% dichlorvos), $\frac{1}{4}\%$ in water spray.	0	Depends on animal size and hair coat.	Mix $2\frac{1}{2}$ pints Ciovap EC in 16 gals. of water. Spray animals thoroughly. Repeat as necessary but not more often than once in 7 days.
	lindane, 1% dust. (Use as bought).	30	Depends on animal size and hair coat.	Do not dust animals less than 3 months old. Do not treat sows within 2 weeks of farrowing or for at least 3 weeks thereafter.
	lindane, 0.06% in water.	30	Depends on animal size and hair coat.	Mix 3 pints of lindane 20% EC, or 2 pounds of lindane 25% WP per 100 gals. of water. Do not expose animals under 6 months of age. Use hog oiler for breeder stock only.
	malathion, $\frac{1}{2}\%$ in water spray.	0	Depends on animal size and hair coat.	Mix 1 quart malathion 57% EC, or 4 lbs. malathion 25% WP per 25 gals. of water. Repeat applications, if needed. Do not use on animals under one month old. Spray thoroughly.
	methoxychlor, $\frac{1}{2}\%$ in water spray.	0	Depends on animal size and hair coat.	Mix 1 quart of methoxychlor 24% EC in 12.5 gals. of water. Spray thoroughly to wet animals.
	ronnel (Korlan), $\frac{1}{4}\%$ in water spray.	42	Depends on animal size and hair coat.	Mix 1 quart Korlan 24% EC per 25 gals. of water. Do not apply more frequently than once every 2 weeks. Spray thoroughly to wet animals.
toxaphene, $\frac{1}{2}\%$ in water spray.	30	Depends on animal size and hair coat.	Mix $3\frac{1}{2}$ quarts of toxaphene 57% EC per 100 gals. of water. Repeat application after 2 to 3 weeks, if desired. Do not use on animals less than 3 months old. Spray thoroughly.	
SARCOPTIC MANGE	lindane, 0.03 to 0.06% in water.	30	Depends on animal size and hair coat.	Mix $1\frac{1}{4}$ to $2\frac{1}{2}$ pints of lindane 20% EC ( $1\frac{1}{2}$ lbs. lindane per gal.) in 100 gals. of water. Treat thoroughly and repeat in 14 to 21 days if necessary. May be applied as a spray or a dip.
		60		Applied as a dip.
	malathion, 0.6% in water spray.	0	Depends on animal size and hair coat.	Mix 1 gal. malathion 57% EC in 100 gals. of water. Spray thoroughly to cover entire body. Repeat in 10 days if necessary. Keep animals out of sun and wind for several hours after treatment.
STABLE, HORSE, DEER AND BLACK FLIES	malathion, $\frac{1}{2}\%$ in water spray.	0	Same as for Lice.	
FLEAS	methoxychlor, $\frac{1}{2}\%$ in water spray.	0	Same as for Lice.	

## WARNINGS AND USE INFORMATION

The use of pesticides is necessary to safeguard the health of livestock as well as increase their production efficiency. When properly used, pesticides are safe and effective, but they can be injurious to humans or animals, or result in harmful residues in meat or milk if used improperly.

As a general rule avoid treating sick, overheated and stressed animals with insecticide. Stress includes shipping, dehorning, castration, sickness of any description, overheating and recent weaning. Avoid contamination of feed and water.

There is some danger to weakened or sick animals when sprayed in winter; instead, use a dust insecticide when possible. However, if you must spray in winter treat on a warm day; if this is done in a barn, turn the animals out immediately to dry.

General warnings for all materials suggested in this bulletin:

- \*Read label before using any insecticide.
- \*Provide ventilation during the use of all materials.
- \*Avoid undue exposure of the animals to mists and vapors during application. Do not apply any material directly on the animals unless directions say you can do so safely.
- \*Do not breathe any form of the insecticides. Face

masks can be purchased for protection.

- \*If any form of insecticides, whether concentrated or diluted, is spilled on the skin, wash immediately with soap and water.
- \*Do not add chemical to old dipping water. Start with fresh water when making a new dip or adding more chemical. If a chemical is concentrated in the dip by using too much, or by adding to an old dip, poisoning of animals and excessive residues in the meat can result.
- \*Meat and milk should not come in contact with any chemical which may contaminate it.
- \*Chemically treated manure should not be applied to any areas in which vegetables are grown, unless specific materials are approved for such vegetables. **Read the label.**
- \*Do not contaminate feed, mangers, watering cups, milking equipment, milk, wells, ponds or streams with pesticides.
- \*Remember, Contamination by any Pesticide Residue May . . .
  - Result in the loss of your milk market
  - Prohibit sale of animals
- \*Store pesticides in their original, plainly labeled containers, safely away from livestock, pets, and children. **Keep them under lock.**

### Michigan Poison Control Centers

#### In Case of Poisoning:

1. *Call your physician.* NOTE TO PHYSICIAN: The table below lists Poison Control Centers in Michigan which can furnish specific information including antidotes for various trade and common named poisons. Services of the Centers are intended mainly for Medical Doctors. However, offices remain open 24 hours a day and can give emergency poison treatment advice over the phone.

2. *For poisons spilled on the skin:* Wash thoroughly with large amounts of soap and warm water. Particles in the eyes may be removed by thorough flushing with plain water. For phosphate materials absorbed through the skin, give atropine by injection or in tablet form.

3. *For poisons that have been inhaled:* Place the patient in the open air. Give atropine as directed above if a phosphate material is responsible. Administer artificial respiration when necessary.

4. *For poisons that have been swallowed,* induce vomiting as soon as possible. To do this, gently stroke the inside of the throat and/or give an emetic such as warm salt water (1 tablespoon in a glass of water). Repeat until the vomit fluid is clear. After the stomach has been emptied give a demulcent such as raw egg white mixed with water.

5. When the physician arrives, he may inject 1/30 to 1/60 of a grain of atropine sulfate at hourly intervals for phosphate materials, or phenobarbital for chlorinated hydrocarbon chemicals.

NOTE: A new antidote, specific for phosphate chemicals, is available to doctors for emergency treatment of phosphate poisoning. This antidote, called PAM (protopam chloride or pralidoxime) can be injected intravenously by doctors or prescribed in tablet form. In several instances persons poisoned by phosphate chemicals have responded to PAM when atropine failed to give desired results.

## Michigan Poison Control Centers

City	City	City	City
<b>ADRIAN</b> Poison Control Center Emma L. Bixby Hospital 818 Riverside Dr. 49221 265-6161 Robert Greiner, M.D., Dir. Thomas Arnold, R. Ph., Assoc. Dir.	<b>POISON INFORMATION CENTER</b> Detroit City Health Department Herman Kiefer Hospital 1151 Taylor Ave. 48202 872-3334 or TR 2-1540 - Ext. 376 Paul T. Chapman, M.D. William G. Frederick, Sc. D.	<b>HANCOCK</b> Poison Control Center St. Joseph's Hospital 200 Michigan Ave. 49930 482-1122 Howard E. Otto, M.D. Sr. Mary Sharon Jones, R. Ph.	<b>PETOSKEY</b> Poison Control Center* Little Traverse Hospital 416 Counable 49770 347-2551 James M. Stamm, R. Ph.
<b>ANN ARBOR</b> Poison Control Center University Hospital 1405 E. Ann St. 48104 764-5102 Patricia O'Connor, M.D. Owen Haig, M.D., Assoc. Dir. Robert Pearson, R. Ph.	<b>POISON TREATMENT CENTER*</b> Saratoga General Hospital 15000 Gratiot Ave. Lakeview 6-5100 Wm. B. Hennessey, Chief Pharmacist	<b>JACKSON</b> Poison Treatment Center* Foote Memorial Hospital 205 N. East St. 49201 783-2771 Ethan Stone, M.D.	<b>PONTIAC</b> Poison Control Center* St. Joseph Mercy Hospital 900 Woodward Ave. 48053 338-9111 Robert J. Mason, M.D.
<b>BAD AXE</b> Poison Control Center Hubbard Memorial Hospital 423 E. Irwin St. 48413 269-6444 Alice J. Shoemaker, R. Ph. Roy Gettel, M.D.	<b>POISON CONTROL CENTER</b> Mount Carmel Mercy Hospital 6071 W. Outer Dr. 48235 864-5400 John Moses, M.D. Forrest P. Becker, R. Ph.	<b>KALAMAZOO</b> Poison Control Center Bronson Methodist Hospital 252 E. Lovell St. 49006 342-9821 H. Sidney Heersma, M.D. Kenneth Huckendubler, R. Ph.	<b>PORT HURON</b> Poison Control Center Mercy Hospital 2601 Electric Ave. 48060 985-9531 Robert Lugg, M.D.
<b>BATTLE CREEK</b> Poison Control Center Community Hospital 200 Tomkins St. 49016 963-5521 Metta Lou Henderson, R. Ph.	<b>ELOISE</b> Poison Control Center Wayne County General Hospital 30712 Michigan Ave. 48132 722-2500, Ext. 6230 - 6231 Gerald Stair, M.D., Dir. Kenneth Vaughn, M.D., Assoc. Dir.	<b>LANSING</b> Poison Control Center St. Lawrence Hospital 1210 W. Saginaw St. 48914 372-3610 Howard Comstock, M.D. Richard Campbell, R. Ph.	<b>SAGINAW</b> Poison Control Center Saginaw General Hospital 1447 N. Harrison Rd. 753-3411 Wm. G. Mason, M.D. Dale Schultz, R. Ph.
<b>BAY CITY</b> Poison Control Center* Mercy Hospital 100 15th St. 895-8511 Frederick Meyer, R. Ph.	<b>FLINT</b> Poison Control Center* Hurley Hospital 6th Ave. & Begole 48502 232-1161 William Nichols, M.D., Dir. Douglas L. Vivian, R. Ph., Coordinator	<b>LINCOLN PARK</b> Poison Control Center* Lansing General Hospital 2800 Devonshire Ave. 48910 372-8220 - Ext. 240 Alan Lahey, D.O.	<b>ST. JOSEPH</b> Poison Control Center Memorial Hospital* 2611 Morton Ave. 49085 893-1674 Marshall J. Feeley, M.D.* James W. Skinner, M.D. 2615 Niles St. 49085
<b>BENTON HARBOR</b> Poison Treatment Center* Mercy Hospital 960 Agard 925-8811	<b>GRAND RAPIDS</b> Poison Control Center Blodgett Memorial Hospital 1840 Wealthy, S.E. 49506 456-5301 John P. Foxworthy, M.D. Donald Ekdom, R. Ph.	<b>MARQUETTE</b> Poison Control Center Outer Drive Hospital 26400 Outer Drive 48146 386-0606 Carl A. Gagliardi, M.D.	<b>TRAVERSE CITY</b> Poison Control Center Munson Medical Center Traverse City 49684 947-6140 Philip K. Wiley, M.D. A. McCrackin, R. Ph.
<b>BERRIEN CENTER</b> Poison Control Center Berrien General Hospital Dean's Hill Rd. 49102 471-7761 Richard C. Chaudoir, R. Ph.	<b>POISON CONTROL CENTER</b> Butterworth Hospital 100 Michigan, N.E. 49503 451-3591 John R. Wilson, M.D.	<b>MIDLAND</b> Poison Control Center Midland Hospital 4005 Orchard Drive 48640 835-6711 K. W. Linsenmann, M.D. Mrs. Anne Gagne, R.N.	<b>WAYNE</b> Poison Treatment Center Annapolis Hospital 33155 Annapolis 722-4400 House Physician on duty
<b>COLDWATER</b> Poison Control Center Community Health Center of Branch County 274 E. Chicago St. 49036 379-9501 John C. Heffelfinger, M.D. Office 278-2359	<b>POISON TREATMENT CENTER</b> Grand Rapids Osteopathic Hospital 1919 Boston St., S.E. 49506 452-5151 Eugene M. Johnson, D.O. Oliver Gysin, R. Ph.	<b>MONROE</b> Poison Control Center Memorial Hospital of Monroe 700 Stewart Road 48161 241-6500 Donald Wojack, R. Ph.	<b>WEST BRANCH</b> Poison Control Center Tolfree Memorial Hospital 335 E. Houghton 345-3660 Emergency Room
<b>DETROIT</b> Poison Control Center Children's Hospital 5224 St. Antoine St. 833-1000 Paul V. Wooley, Jr., M.D. Regine Arorow, M.D.	<b>POISON CONTROL CENTER</b> St. Mary's Hospital 201 LaFayette, S.E. 49503 459-3131 Wallace Duffin, M.D. Myrtle McLain, M.D., Assoc. Dir.		<b>YPSILANTI</b> Poison Treatment Center Beyer Memorial Hospital 28 So. Prospect 48197 HU 2-6500 Gust Petropolous, M.D.

\* Facilities available for determining cholinesterase levels in blood samples.