

TYPE
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FLY



CONTROL

SANITATION

and DDT =

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Circular 626

UNIVERSITY OF ILLINOIS — COLLEGE OF AGRICULTURE

Extension Service in Agriculture and Home Economics

IN COOPERATION WITH ILLINOIS STATE NATURAL HISTORY SURVEY

By W. N. BRUCE and H. B. PETTY

SIX RULES

For the SAFE use of DDT

1. Don't let any more of the DDT oil solutions get on your skin than you can help. Wash thoroly after spraying.
2. Wear a respirator or handkerchief over your nose and mouth when spraying DDT for any length of time in confined places.
3. Don't let any DDT get directly onto food or into drinking water either in the home or in the barns. The drift of sprays onto feed or into water troughs, in barns, is of little importance.
4. Keep DDT, as well as other insecticides, out of the reach of young children and animals.
5. Do not use DDT on cats.
6. Do not mix DDT with lime or other strongly alkaline materials.

**Correctly handled, DDT presents no dangers
to people or to animals**

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FLY CONTROL . . .

On the Farm and in the House

By W. N. BRUCE and H. B. PETTY¹

COMMON HOUSEFLIES are a serious threat to human health. They help to spread typhoid, cholera, dysentery, diarrhea, tuberculosis, possibly poliomyelitis, and many other human diseases. Millions of germs are carried on their body hairs, wings, and mouthparts, as well as in the alimentary canal. Breeding primarily in decaying organic matter, houseflies frequent barnyards, privies, garbage dumps, putrefying animal carcasses, and other foul-smelling materials before they discover human food upon which to crawl and deposit their cargo of germs. The germs are deposited by direct contact and are also in the specks (vomitings and droppings) which the flies leave wherever they crawl.

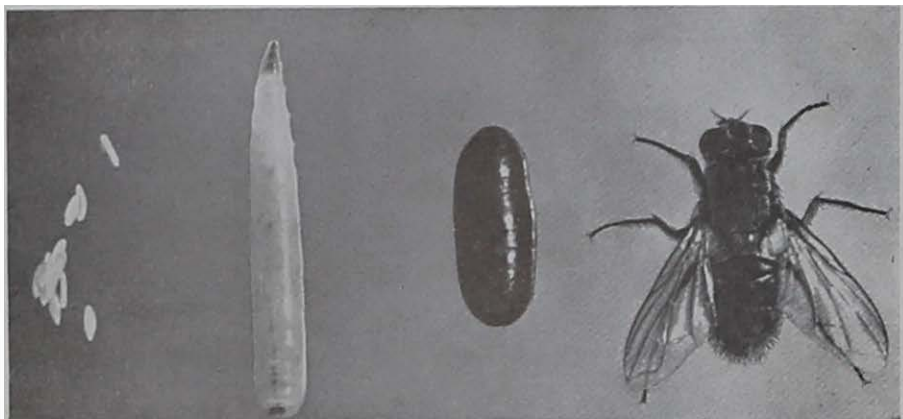
Besides endangering health, flies are an annoyance to both man and animal. For these reasons, many authorities brand the common housefly as man's most dangerous insect enemy. Houseflies, however, are incapable of inflicting any direct injury, as they cannot suck blood.

Stable flies and horn flies, unlike the housefly, are blood-sucking insects. In Illinois their attacks on dairy and beef cattle cost farmers thousands of dollars each year. Because of the loss of blood and the annoyance resulting from attacks by these flies, milk flow may be reduced as much as 15 percent. Beef production is often decreased $\frac{1}{4}$ to $\frac{1}{2}$ pound a day. The livestock feeder and the dairyman will find that controlling these pests not only means a financial gain but also makes the animals less nervous and easier to handle. Both horn flies and stable flies have been suspected of transmitting several diseases of livestock.

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How and Where Flies Live

Houseflies. Houseflies, like all other flies, have four stages in their life cycle — egg, larva (maggot), pupa, and adult. The adults are equipped with flat, two-lobed, sponging mouthparts. With these the flies lap up nourishment from milk, sugar, meat,



Eggs, larva, pupa, and adult of the housefly. Stable flies and horn flies also pass thru these four stages.



A favorite swarming place of houseflies is the garbage can. Note how fly in the insert has pushed out its mouthparts as it gets ready to feed.

blood, manure, or other fly foods. When the adults are about 3 to 5 days old, they begin to deposit their eggs in actively decaying manure, garbage, and similar material. A housefly lays 50 to 150 eggs a day over a period of 2 to 10 weeks. In 10 to 24 hours, the eggs hatch into white maggots about $\frac{3}{32}$ inch long. These develop rapidly and become full grown (about $\frac{3}{4}$ inch long) in 3 to 7 days. The mature larvae move to drier places and change into reddish-brown pupae about the size of grains of wheat. Adults emerge from these pupae in 4 or 5 days. Thus a generation may be completed in about 2 weeks.

Horn flies. The small bloodsucking horn flies reproduce very rapidly under range and pasture conditions. Large numbers are often present in the spring before there are many other flies. The



Horn flies are found by the hundreds on the backs of unsprayed steers. They are about half the size of houseflies. The enlarged front view shows some other differences between this fly and the housefly.

adults are thick on the backs, shoulders, briskets, and necks of cattle.

Horn flies are not strong fliers and usually stay with one herd of cattle, upon which they feed. The adults leave the animals briefly to lay their eggs upon freshly dropped manure, then return to suck more blood or to rest on the animals and nearby vegetation. The maggots which hatch from these eggs become full grown in about 4 days. At maturity they become pupae, and in 2 or 3 days the adults emerge and feed for a short time before laying eggs to start the next generation. The short life cycle (about 10 days) of these flies, the plentiful supply of blood, and an abundance of material for them to breed on explain their rapid build-up and their large numbers on cattle.

Stable flies. Often called "leg flies" or "dog flies," stable flies are found most frequently on or near their hosts, and near places where they breed. They are numerous under the eaves and on the outside surfaces of buildings; on fences, trees, open sheds, and feeding racks; and in sheltered places. Despite their name,



Stable flies suck blood from cattle and are found commonly on the front legs and shoulders of the animals. They are about the same size as houseflies. Note piercing, sucking mouthparts of stable fly in insert.

however, they usually make up only a small percentage of flies within a barn.

The adult stable fly looks like a housefly but has a prominent proboscis (mouthparts) protruding from the front of its head. The stable fly uses these piercing mouthparts to penetrate the skin of the animal and suck blood. The stable flies' favorite feeding places on cattle are the front legs, shoulders, and neck. The adult flies seek decomposing grass, hay, and straw in which to lay their eggs. The life cycle and stages are similar to those of the housefly but last longer.

Since these flies breed in numerous places and may fly long distances for a blood meal, all farms in the neighborhood must be treated for most effective control.

Clean-Up Measures Come First

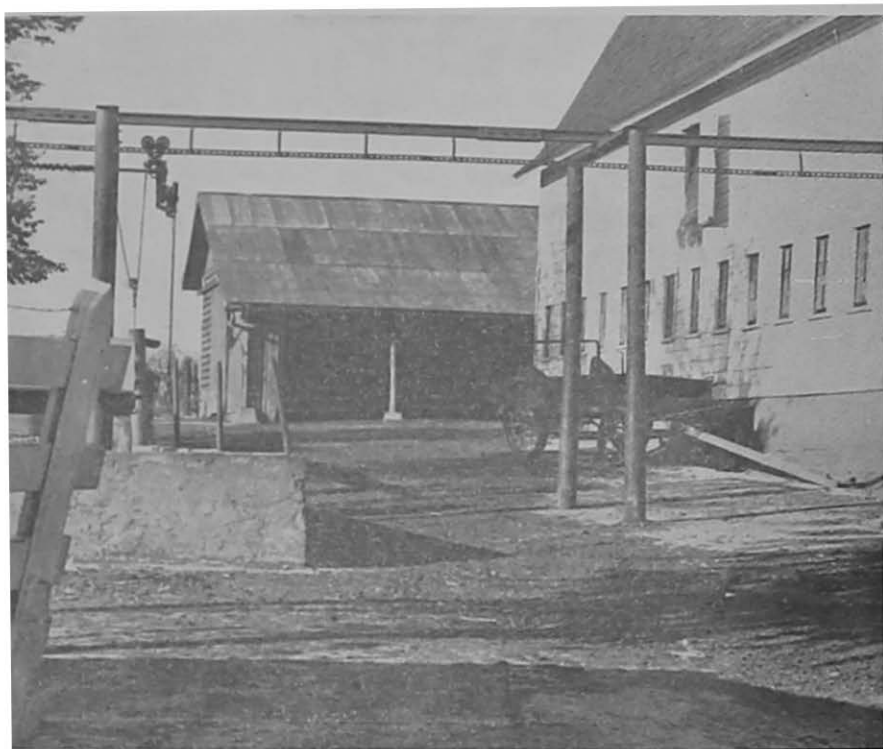
Sanitation will reduce the number of houseflies and stable flies to a point where they may be effectively controlled with the correct use of DDT sprays. Since only 4 or 5 days may be needed for maggots to complete their development, all material where they breed must be disposed of twice a week. Manure should be scattered on fields that need it — not left in piles. Old stack



Flies breed in decaying organic materials, especially manure. Keep all such materials well cleaned up.



Manure should be hauled to the fields twice weekly so that maggots (the larvae of flies) cannot complete their development in it.



A clean barnyard is absolutely necessary for fly control.

bottoms, and feed and other rubbish under feeding racks, should be cleaned up. Garbage should be destroyed. These are all favorite breeding places of flies.

Sanitation will not help in the control of horn flies; for them, insecticides must be relied upon completely.

DDT Most Effective Spray

Several insecticides will kill flies for a considerable time after being sprayed inside buildings. Of these DDT seems most effective and economical. In restaurants and other places where food is handled, however, the DDT or the dying flies may contaminate the food. In these places it may be advisable to use substitutes for DDT.

Emulsifiable DDT concentrates, 50-percent water-wettable DDT, and 5-percent DDT oil solutions are available for use on the farm and in the home. The 5-percent DDT oil solutions are used mostly to paint screens. When used in confined areas or on unpainted wood they may present a fire hazard. *DDT oil solutions should never be sprayed on livestock.*

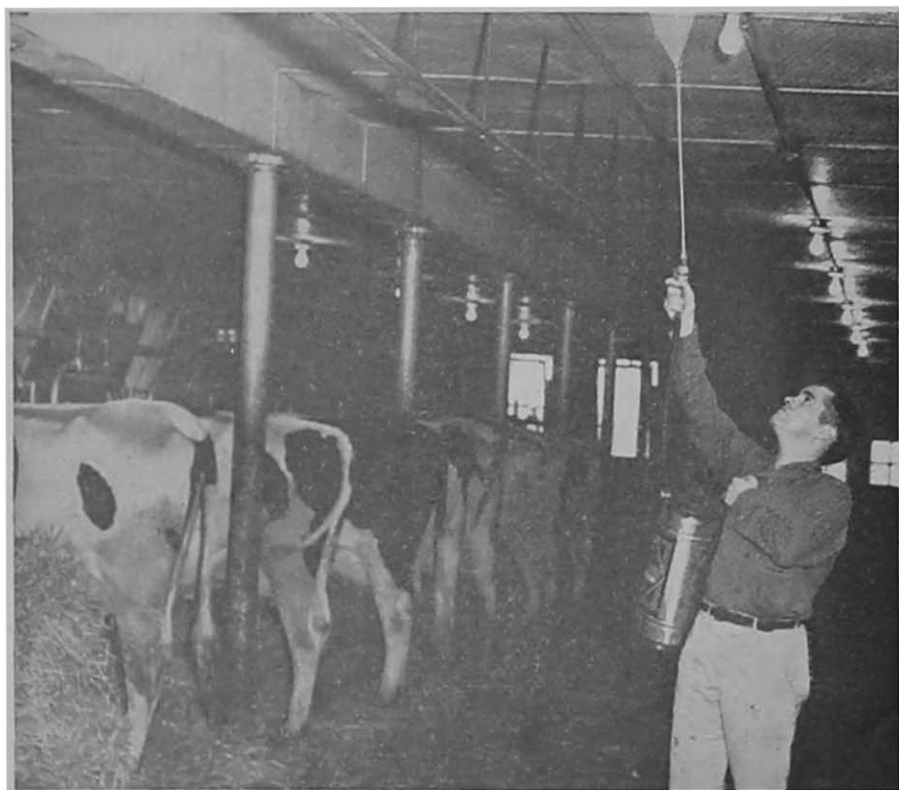
Emulsifiable DDT is commonly sold as a 25-percent concentrate which may be diluted with water to the desired strength. The DDT emulsion is safer for use on animals and in buildings than are the oil solution sprays.

When used at recommended dosages, 50-percent water-wettable DDT is the safest and best formulation for animals and confined spaces. On a wide variety of surfaces, the residual deposit remains toxic longer than the deposits of other formulations. This is especially true of painted, whitewashed, and concrete surfaces. The disadvantage of the wettable-powder deposit is that it is white. Where this white deposit is objectionable, oil solutions or emulsions can be used.

How to apply. There are many kinds of sprayers. The type to be used will depend upon the size of the job and what is available. A power sprayer is generally best for spraying large herds of beef cattle. The person who has several cows and a few barns and sheds can do a good job of spraying with a small compressed-

air sprayer holding 2 to 4 gallons. For applying DDT residual sprays around the home, a paint brush, a small compressed-air sprayer, a paint sprayer, or even a small hand sprayer is satisfactory.

How much to use. For lasting results there should be a deposit of at least $\frac{1}{2}$ pound of actual DDT on every 1,000 square feet of surface where flies roost. If 50-percent wettable powder is used, 1 pound of the powder may be mixed in 2 to 3 gallons of water and applied to 1,000 square feet of surface with a small sprayer. For large sprayers, 32 pounds of wettable powder in 100 gallons of water should be used at a rate of 3 gallons to 1,000 square feet. When 25-percent DDT emulsion concentrate is used in a hand sprayer, 1 quart should be diluted to 1 to 3 gallons with water. This will cover 1,000 square feet. For large sprayers 8



A DDT spray must be applied inside the barn, and it must hit all places where flies roost. A compressed-air sprayer will do the job.



DDT applied to outside areas, such as board fences and the outside of buildings, will not only help to control houseflies, but will also reduce the number of stable flies.

gallons of 25-percent concentrate may be diluted to 100 gallons with water and applied at the rate of 3 gallons per 1,000 square feet. See pages 12 to 15 for the best amounts to use on livestock.

Where to apply. To rid farm buildings of flies, all roosting places must be treated. These include walls, ceilings, rafters, light fixtures, wires, and areas near entranceways. Treating fences and outside surfaces of barns and feed racks will do much to cut down the number of stable flies. The home can be cleared of flies by treating screens, porches, garbage containers, and entrance ways with DDT. It is particularly important to treat outside toilets. Applications to the entranceways of restaurants and food process-



Paint screens every 2 to 4 weeks with DDT. Use a 5-percent oil solution or a 25-percent emulsion reduced to 5-percent strength.

ing plants will kill many flies that might otherwise get inside and become a nuisance.

When to apply. Buildings should be treated in June to prevent a build-up of flies early in the season. Outside surfaces that are exposed to weathering and also frequented by flies should be re-treated at 2- to 4-week intervals thruout the summer. Interiors of buildings may need a second treatment in early September to keep the flies under control.

The following section gives information on the best intervals for spraying livestock.

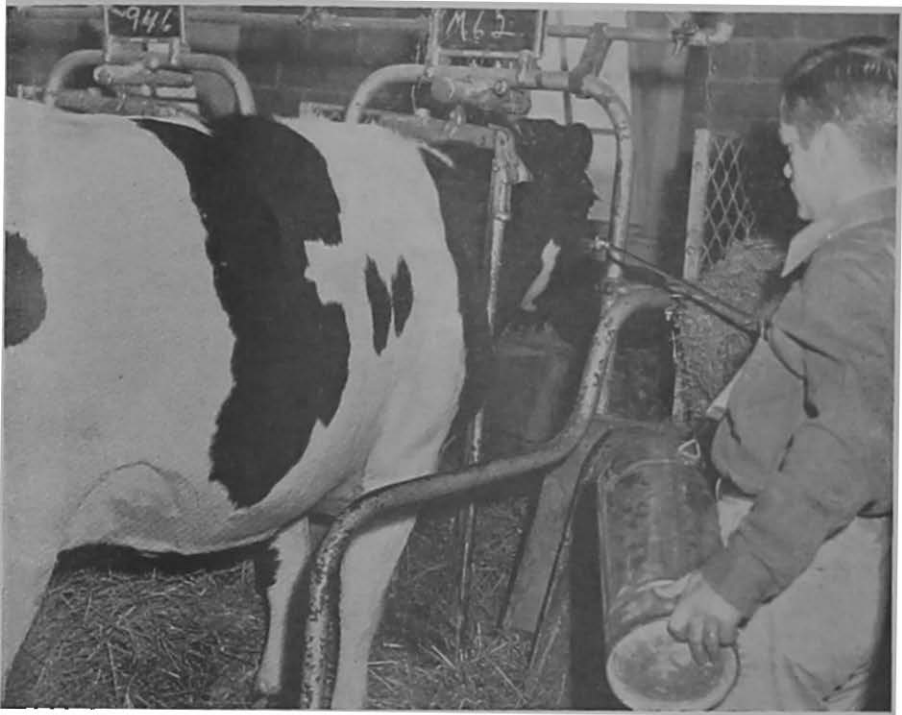
Spray garbage containers, inside and out, and the areas around them, including porches and porch ceilings, at least once a month with DDT.



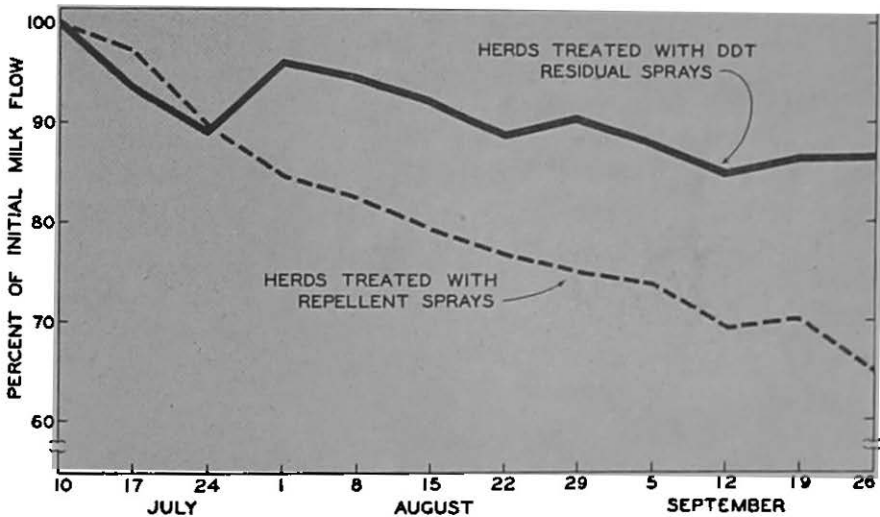
Fly Control on Livestock

Dairy cattle. Spraying dairy cattle with DDT wettable powders will keep the animals free of horn flies and almost free of stable flies. If 50-percent wettable powder is used, mix $\frac{1}{2}$ pound in 3 gallons of water, and apply 1 pint to each cow once a week. Daily applications of 1 or 2 fluid ounces on each cow gives better control but takes more work. In using emulsions, follow the manufacturer's directions.

The first application should be made when flies appear on the animals in the spring. The front legs, shoulders, neck, brisket, and the front half of the body should be thoroly saturated with spray solution. It is not necessary to spray the rear half of an animal, since flies do not frequent the area reached by the tail. Also, spraying only the front part of the cow will virtually do



Stable flies on dairy cows can be controlled by spraying the cows once a week. Only the front half of the animal need be sprayed.



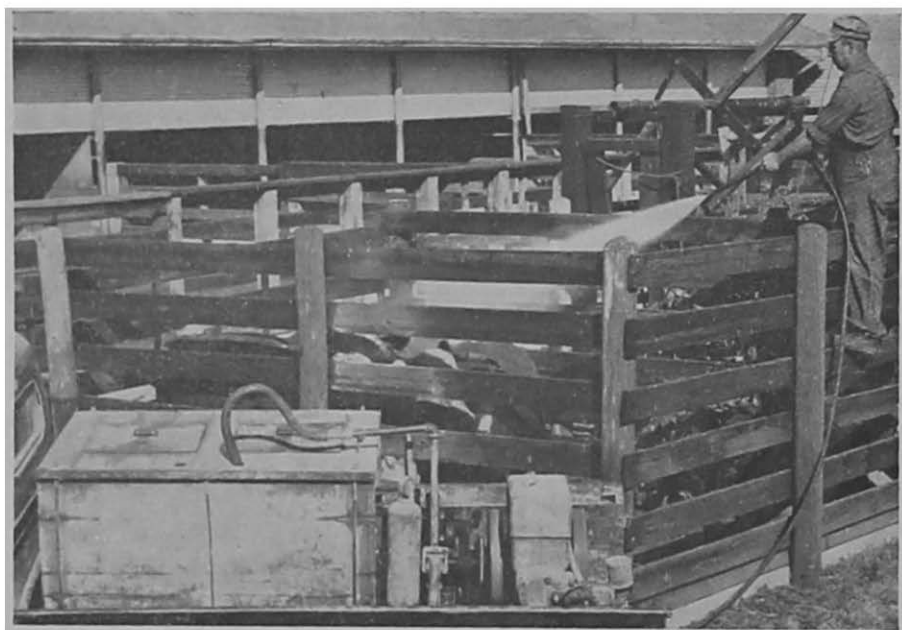
Four herds (16 to 20 cows each) sprayed with DDT produced up to 15 per cent more milk than four herds treated with old-type sprays. All barns were treated with DDT 4 weeks before the experiment began.

away with any direct contamination of the milk. Those who greatly fear contamination, however, can obtain a degree of fly control by spraying only the animals which are not being milked.

Stable flies will not entirely disappear with the first treatment, but the number will decrease over a period of 1 to 3 weeks. It takes persistent use of DDT spray on the animals to control stable flies, as they are in contact with the animal for a relatively short time while obtaining a blood meal, and pick up only small amounts of DDT.

Work done by the Illinois Natural History Survey shows that flies can reduce milk production materially and that getting rid of them may bring about as much as a 15-percent increase in milk production. The actual cost of DDT spray is insignificant in relation to the gains that may be obtained in milk yield and in comfort to people and animals.

Beef cattle. Horn flies, which number hundreds per animal, are more of a problem on beef cattle than are stable flies. DDT sprays readily control horn flies, as these flies remain for long



Spraying beef cattle with DDT to control flies means that the animals will put on extra pounds during the summer months.

periods of time upon the treated animals and thus are well exposed to DDT. Also, the horn fly, unlike the stable fly, will not fly great distances for food. Horn flies can be controlled by spraying animals at monthly intervals with 8 pounds of 50-percent DDT wettable powder in 100 gallons of water, or with $\frac{1}{4}$ pound of wettable powder in 3 gallons of water. Apply at a rate of 2 quarts per animal for each application. The first spray will last about 3 weeks and the succeeding applications 4 to 5 weeks. If emulsions are used, follow the manufacturer's directions.

Experimental work in Illinois, Kansas, Oklahoma, and many other states shows that horn-fly control means a considerable gain in pounds of meat and in comfort to the animals. In parts of Oklahoma and Kansas, increased gains of $\frac{1}{2}$ pound of meat per animal per day have been attributed to horn-fly control.

Other livestock insects controlled. Cattle sprayed for the control of flies during the summer months are seldom bothered by attacks of lice during the winter months, as DDT is an effective louse killer. Hog lice may also be controlled by the use of DDT at the concentrations applied to beef cattle. During winter months 5-percent DDT dust may be used at the rate of 1 ounce per animal to control lice.

If fleas are a problem on the farm, the floors of all infested buildings should be treated at the time the applications are made for fly control. Applications made in late spring will prevent a serious build-up of fleas later in the season.

Chicken houses are often sprayed to aid in the control of flies. If the roosts and nests are sprayed at this time, DDT will get rid of roost mites also.

Sheep "keds," or ticks, are easily controlled with DDT sprays or dips containing 4 to 8 pounds of 50-percent water-wettable DDT powder in 100 gallons of water.

FOR GOOD FLY CONTROL

Keep premises clean. Promptly dispose of refuse in which flies breed. This is essential for near-perfect results.

Use residual sprays in barns. Spray $\frac{1}{2}$ pound of actual DDT per 1,000 square feet of surface where flies roost.

Use DDT around the home. Paint screens with DDT, treat porches, and spray garbage containers at least once a month.

Spray livestock. For dairy cattle mix $\frac{1}{2}$ pound of 50-percent DDT powder in 3 gallons of water. Spray each animal with 1 pint a week, or with 1 to 2 fluid ounces a day. For beef cattle use $\frac{1}{4}$ pound of 50-percent DDT powder in 3 gallons of water. Spray each animal monthly with 2 quarts of the solution.

FLY CONTROL MEANS

***Better health for man and animals • More comfort
Increased milk and meat production***

REVISED RECOMMENDATIONS FOR FLY CONTROL 1949

(Changes made since publication of Circular 626,
"Fly Control," in May, 1948)

Don't Use DDT Around Dairy Cattle

DDT is no longer recommended for use on dairy cattle or in dairy barns. Milk with traces of DDT has been produced by dairy cattle that have absorbed DDT thru the skin or have eaten it with their food. A recent memorandum from the Pure Food and Drug Administration implies that no DDT will be permitted in milk and dairy products.

Other chemicals that should *not* be used around dairy cattle are chlordane, benzene hexachloride, toxaphene, TDE, and similar chlorinated hydrocarbons.

Methoxychlor Recommended for Dairy Cattle

Methoxychlor can be used instead of DDT in the dairy barn and on dairy cattle. This chemical has many of the desirable characteristics and few of the undesirable characteristics of DDT. It is far less toxic than DDT to warm-blooded animals, and experiments show that it does not readily appear in milk when used on dairy cattle or in dairy barns. The U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, reports, "The Food and Drug Administration has stated that methoxychlor used in place of DDT for this purpose is unobjectionable from the health standpoint."

When treating dairy barns with methoxychlor, use 1 pound of 50-percent wettable powder in 2 to 4 gallons of water to each 1,000 square feet of surface. Apply two or more times during the summer. Spray dairy cattle with methoxychlor every 2 to 4 weeks for the control of horn flies. Use $\frac{1}{2}$ pound of 50-percent powder in 3 gallons of water and apply 1 quart to each cow.

Activated pyrethrins or old-type fly sprays may be used in dairy barns or on dairy animals without violating the Food, Drug, and Cosmetic Act.

Most Recommendations Remain the Same

Sanitation is still the primary step in fly control, no matter what spray is used. DDT can still be used on beef cattle, in barns other than dairy barns, and on outside surfaces as recommended in this circular.

Cautions

When using any fly spray, be careful not to get it onto dairy feeds, water troughs, feed troughs, milk utensils, or any other equipment or materials used in producing milk.

Resistant Flies

If good sanitation and thoro application of DDT sprays do not control flies, a resistant strain may have developed. When this happens, chlordane, benzene hexachloride, or toxaphene can be used in place of DDT, but not in dairy barns or on dairy cattle. In those places use methoxychlor or activated pyrethrins.

Cooperative Extension Work in Agriculture and Home Economics: University of Illinois,
College of Agriculture, and the United States Department of Agriculture cooperating.
H. P. Rusk, *Director*. Acts approved by Congress May 8 and June 30, 1914.

(This leaflet is issued in cooperation with the
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