Controlling Flies on Dairy Cattle and in Dairy Barns

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Flies affect dairy cattle in two ways—namely, by biting and sucking their blood and by transmitting diseases. The horn-fly (Siphona irritans), the stable-fly (Stomoxys calcitrans), a variety of species of tabanids, and other biting Diptera are a constant worry to cattle. They cause a waste of energy and also interfere with feeding. The common house-fly (Musca domestica) occurs wherever cattle are produced, and, although a non-biter, this species spreads filth and disease organisms and serves as an intermediate host of certain internal parasites.

Few people realize the magnitude of losses caused by flies. Tests conducted by the US Department of Agriculture in 1945, in co-operation with several midwestern states, showed that beef cattle heavily infested with horn-flies gained an average of 50 pounds (about 23 kg) less during the fly season than insecticide-treated cattle. In 1947 the University of Illinois demonstrated that dairy cattle protected from horn-fly attack produced 10%-20% more milk than unprotected cattle. The same investigators found that tabanids in moderate numbers will reduce the butterfat production of dairy cattle by as much as 20%. Severe annoyance from mosquitos and stable-flies may cause as great a reduction in weight gains and milk production as horn-fly and horse-fly infestation, but good data on losses in production are not available.

No estimates are available on the losses in dairy cattle attributable to diseases and parasites transmitted by biting flies and house-flies. However, it is known that horse-flies and deer-flies are capable of transmitting anaemia, anthrax, and tularemia, and that the house-fly is capable of transmitting certain enteric diseases and parasites and of contaminating milk with filth and disease organisms. In order to prevent production losses and to ensure the purity of milk, fly control should be practised in and around dairies. A résumé of recommended control measures for the various species is given below. The methods of control outlined for use in the USA are based on investigations by the US Department of Agriculture, state experiment stations, the US Public Health Service, and various industrial concerns.

Horn-flies. The horn-fly is a serious pest of cattle and breeds exclusively in cattle droppings. The adult, which is about one-half as large as the house-fly, stays on cattle almost continuously, leaving only briefly to oviposit on fresh droppings. Because of its habit of living on cattle, the horn-fly is easily controlled with insecticides, and little attention is given to control by sanitation, i.e., the collection or spreading of droppings in feed lots and pastures. However, droppings in feeding and milking barns should be collected or otherwise disposed of daily, or after each milking,
for sanitary reasons and to aid in preventing the breeding of several species of flies.

Spraying is the best method of applying insecticides for the control of horn-flies on dairy cattle, especially in the case of large herds. The amount of spray to apply will depend on the size of the animal and the thoroughness of the treatment. From 1 to 2 quarts (about 1-2 litres) is sufficient to treat the animals' backs, where most of the flies prefer to rest and feed. Small, hand-pressure or knapsack types of sprayers are satisfactory for the treatment of small herds, but power sprayers are more practical for treating large herds.

Methoxychlor is recommended in the USA for the control of horn-flies on dairy cattle, because little of this insecticide is excreted in the milk. It is usually used at a concentration of 0.5%, either as an emulsion or as a wettable powder suspension. Treatments with this concentration provide effective control of horn-flies for about 3 weeks. Similar results can be obtained with methoxychlor dusts. The 50% wettable powder may be applied without dilution at the rate of 1 heaped tablespoonful per animal, a shaker can being used to distribute it evenly over the back of the animal.

Available data indicate that if 0.5% methoxychlor sprays are used the milk is only slightly contaminated, generally less than 0.2 p.p.m. being present the first and second days after spraying and only trace amounts after four days.

Synergized pyrethrum or allethrin sprays are suitable and effective for use in controlling horn-flies on dairy cattle. The finished spray should contain from 0.025% to 0.1% pyrethrins or allethrins and from 0.25% to 1.0% of a pyrethrum synergist. These concentrations may be obtained by diluting a synergized pyrethrum emulsifiable concentrate (1% pyrethrins and 10% synergist) with water. The finished spray, applied at the rate of 2 quarts (about 2 litres) per animal, will control horn-flies for 3-7 days. Although less effective than methoxychlor against horn-flies, synergized pyrethrum sprays provide better protection against stable-flies, house-flies, horse-flies, and mosquitos. At the present time, there are no restrictions on the use of pyrethrum sprays on dairy cattle. From 3% to 5% of organic thiocyanates in oil, applied at a rate of 1 or 2 ounces (about 30 or 60 g) per animal, gives a fair degree of horn-fly control. In view of the effectiveness of pyrethrum sprays against most of the flies, it is perhaps the best all-purpose treatment for use on dairy cows, even though the length of the period of protection leaves much to be desired.

In some situations self-treatment devices are useful for the control of horn-flies on dairy cattle. One such device consists of a post wrapped with insecticide-treated burlap sacks or a cable similarly wrapped and stretched between two posts. A chain or several strands of wire serve as a cable, and this is stretched from the top of a 4-foot (1-metre) post to an anchor at ground level, 15-20 feet (about 5 metres) away. It is advisable to locate this device near watering or feeding places or where animals rest, so that the cattle will rub against it to relieve the irritation from horn-flies. The burlap sacks should be treated with 5% methoxychlor oil solution
at the rate of about 1 gallon per 15 or 20 feet (about 4 litres per 5 metres) and re-treated at intervals of 3-5 weeks.

Automatic or treadle-type sprayers are useful and highly effective in controlling horn-flies. Such sprayers are usually installed in gateways between pastures and watering or feeding places, so that cattle are compelled to pass through them. These sprayers are designed to dispense only 2-4 ml of insecticide oil solution per animal. These small amounts will control horn-flies without injuring the animals, even though applied several times daily. Synergized pyrethrins or methoxychlor oil solutions are satisfactory for use in treadle sprayers.

**Stable-flies.** Stable-flies have piercing mouth parts and feed readily on any type of livestock but are especially annoying to dairy cattle. A relatively small stable-fly population can seriously interfere with the comfort and feeding of dairy cattle and markedly reduce milk production. Control of stable-flies is difficult but can be achieved by ensuring proper sanitation (thus preventing the accumulation of breeding material), by spraying barns and other resting places, and by treating animals with insecticides.

Sanitation is an absolute necessity in effectively combating the stable-fly. Manure should be collected and spread on fields at least twice a week. Plant material such as hay, citrus pulp, peanut litter, and other waste vegetable matter should not be allowed to accumulate, especially during damp weather. Such materials should be disposed of or thoroughly treated with appropriate insecticides to prevent the flies from using them as breeding media.

The application of residual type insecticides to dairy barns, corral fences, trunks of trees or similar places where flies rest will usually minimize stable-fly populations on individual farms. Methoxychlor, lindane, malathion, chlorthion, and diazinon are recommended in the USA for use as residual treatments in dairy barns. Methoxychlor should be applied at a concentration of 5%, lindane, chlorthion, and malathion at 1.0%, and diazinon at 0.5%, at rates of 1-2 gallons per 1000 square feet (about 7 litres per 100 m²) of wall and ceiling surface. Either wettable powder suspensions or emulsions may be employed for residual treatments. However, if methoxychlor wettable powder is used, it is necessary to reduce the concentration from 5.0% to 2.5%, in order to prevent the clogging of spray nozzles. Power sprayers are most practical for applying residual treatments, but hand sprayers can be employed to treat small areas.

DDT, chlordane, BHC, and dieldrin are not recommended for use inside dairy barns, but can be employed in other farm buildings and outside the dairy barns.

When insecticides are used, either inside or outside dairy barns, care should be taken to avoid the contamination of feed and water or the troughs which contain them.

Synergized pyrethrum sprays are effective in preventing stable-flies from attacking live-stock. A water spray of the type recommended for horn-fly control, containing 0.1% pyrethrins and applied at the rate of 1-2 quarts (about 1-2 litres) per animal, will often provide protection for several days.
Oil-base cattle sprays containing pyrethrum or allethrin applied by hand sprayers as a light mist at each milking will give good protection from stable-flies for several hours. Only 1 or 2 ounces (about 30-60 g) of oil should be sprayed at each treatment. Larger quantities must not be used, as an excessive amount of oil can burn the skin of the animal. The automatic or treadle sprayers, which apply pyrethrum mists in the way described for horn-fly control, are also useful in protecting dairy cattle from stable-fly attack.

**Horse-flies and deer-flies.** Horse-flies and deer-flies are vicious biters, and a relatively small population can severely annoy cattle. As previously mentioned, they are also capable of spreading anaplasmosis, anthrax, and other diseases. At present there is no known way to control these species in their breeding places, so protective treatments must be relied upon to minimize annoyance and injury to dairy cattle. The sprays used to protect dairy cows from stable-flies will also give some protection from horse- and deer-flies. The automatic treadle sprayer and the pyrethrum sprays mentioned in connexion with the control of the stable-fly have also provided good protection against horse- and deer-flies in some areas.

**House-flies.** Although the house-fly does not bite livestock, it is a serious pest because of the diseases and parasites it carries and spreads. It is attracted by filth and poor sanitation, breeding abundantly in manure, garbage, and decaying vegetable matter. Its biological potential is far greater than that of other flies and for this reason good sanitation is prerequisite to control. Manure and other breeding media must be disposed of completely and regularly to minimize house-fly breeding. The principles of good sanitation are known and apply the world over and are therefore not discussed here in detail.

The application of insecticides in some form or another—as residual treatments, in baits, or on cords installed in dairy barns and on outdoor resting places—are usually a necessary adjunct to sanitation in controlling the house-fly. Residual treatments of methoxychlor, lindane, malathion, diazinon or chlordane may be used in dairy barns in the manner described for the control of stable-flies. If the house-flies are not resistant to the chlorinated hydrocarbon insecticides, residual treatments of methoxychlor and lindane will provide effective control for several weeks or more. Where these materials do not provide satisfactory control, malathion or diazinon should be used. Since significant resistance to this class of insecticides has not developed as yet in house-flies in the USA, residual applications provide excellent control in most locations for periods ranging from several weeks to several months. The concentrations and methods of applying residual treatments for house-fly control are similar to those described for the control of stable-flies.

Poison baits are very effective in controlling house-flies. The baits may be granular or liquid formulations, but all consist of an organic phosphorus insecticide and a food attractant. Insecticides approved for use in baits are malathion, diazinon, Bayer L 13/59, chlordane, and
flies in can be obtained this objective.

Liquid baits are usually mixed to contain 0.1% insecticide and 10% attractant in a water solution. Either emulsifiable concentrates or wettable powders may be used in liquid baits. The finished bait is usually sprinkled on barn floors in narrow strips, at the rate of 1 gallon per 1000 square feet (about 5 litres per 100 m²) of surface. Applications may be made with a garden sprinkling can or with a hand-pressure sprayer equipped with a coarse spray-nozzle. Liquid baits are most effective on hard, non-absorbent surfaces. If surfaces are absorbent or littered, the rate of application should be increased, and it would also be desirable to increase the amount of attractant to 25%-50% to ensure an adequate deposit for the flies to feed upon. Baits may be applied to burlap sacks or to strips of tin, wood, or paper placed in areas where flies congregate. Liquid baits should be applied daily until the flies are brought under control, and thereafter as often as is needed to keep fly populations at a low level.

Several types of granular baits have been developed, and with few exceptions all have provided excellent control of house-flies. The most widely used formulation consists of dry granulated sugar with 1% or 2% malathion, Bayer L 13/59, diazinon, or chlorthion. This bait is well suited for use in barns and sheds with dry, hard floor surfaces but dissolves and quickly loses its effectiveness on damp surfaces.

The most satisfactory dry baits for use on damp surfaces and in outdoor situations are prepared with inert granular materials such as cornmeal, grits, sand, or crushed oyster shell. These materials are coated with a mixture of insecticide and attractant, preferably powdered sugar. A small amount (2%) of peanut or other vegetable oil added to the granular material will enhance adherence of the insecticide and attractant, but its use is optional. Finished baits consist of 1% or 2% organic phosphorus insecticide, 10% sugar, and 88% inert carrier.

Dry baits should be applied with a shaker-type dispenser wherever flies congregate and feed. About one-fourth of a pound (100 g) of dry sugar bait or 1 pound (400 g) of granular bait is sufficient to control average-sized fly populations in a dairy barn with a floor area of 2500-5000 square feet (roughly 250-500 m²). Heavier applications may be required for outdoor use or for the control of exceptionally large fly populations in barns.

Tests have shown that the use of insecticides in dairy barns, as outlined above, does not result in the contamination of milk, provided that applications are made when the cattle are absent from the barns and precautions are taken to prevent the contamination of feed and water.

The use of organic phosphorus compounds, such as parathion and diazinon, as cord impregnants is an effective means of controlling house-flies in some situations. Best results are obtained when the treated cords are installed in barns as soon as the first flies appear in the spring. Control can be obtained in most instances by installing treated cords after flies have become abundant, but two or three weeks may be required to achieve this objective.
Cords for installation in barns should be made of cotton and be 3/32-3/16 inch in diameter. The larger size is necessary with diazinon, but either size is satisfactory with parathion. Cords should be treated by dipping in 5% or 10% parathion-xylene solution or 25% diazinon-xylene solution. After drying, the cords are strung along the ceiling or rafters of barns at the rate of 30 linear feet per 100 square feet (9 m per 9 m²) of floor area. Usually the cords will provide effective control for 7-11 weeks and in many cases for an entire fly season.

Extreme care must be taken in preparing and handling dipping solutions and treated cords. Experienced personnel can safely impregnate cords, but it is advisable for most users to purchase a commercial product. Cotton gloves should be worn while the cords are being installed. At the end of the fly season, it is advisable to remove and burn or bury the cords.

Cords have been registered for use in dairy barns in the USA.

The Toxicity of Three Organic Phosphorus Insecticides to Houseflies and Mosquitos*

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The development of strains of mosquitos and houseflies resistant to chlorinated hydrocarbon insecticides has intensified the interest shown in the insecticidal properties of other groups of chemicals, especially organic phosphorus compounds. A number of phosphorus insecticides with a comparatively low degree of mammalian toxicity have become available recently, and the relative toxicities of three of them to houseflies and some mosquito species have been determined.

Materials and methods

Test insects. Breeding was carried out by standard methods at 25°C, and the following adult insects were used:

Musca domestica L.: 3-4-day-old females, fed on milk.

Aedes aegypti L.: 2-3-day-old females, a few hours after the first blood meal on guinea-pigs.

Culex pipiens molestus Försk (London strain): 1-2-day-old, unfed females, reared from eggs obtained from females fed on apple and sugar.

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