

## Livestock Area Fly Control

*Eric R. Day, Extension Entomologist, Virginia Tech*

### Fly Control in Milk Rooms

**Warning:** Extremely small amounts of pesticide residues can be detected in milk. For all practical purposes, the tolerance level for pesticide residues in milk is ZERO. Moreover, the presence of such residues in milk is virtually always illegal. To avoid pesticide residues in milk, dairy producers are cautioned to use ONLY those pesticides that are labeled for use in dairy operations. The following steps are suggested for managing flies in milk rooms:

- (a) Use good sanitation and only labeled insecticides in dairy barns to reduce the number of flies entering the milk room.
- (b) Use tight screens (14-16 mesh per inch) in good repair on milk room doors and windows. Screens made of copper, aluminum, bronze, plastic, or rust-resisting materials are best.
- (c) Use sticky flypaper (Lure-Fly ribbons), sex pheromone sticky paper (Fly Stik with Muscalure), or sticky foil flypaper with flies printed on it to attract other flies.
- (d) Dichlorvos (Vapona) resin strips work best in controlling flies if windows and doors are kept closed. Replace strips when they become ineffective.
- (e) **Use only labeled** space spray treatments in milk rooms when the above strips do not give adequate fly control. Avoid contaminating milking utensils, cans, bulk tanks, and containers. Remove these items from the milk room or completely cover them before spraying.

### General Fly Control Methods for Livestock

#### **Sanitation**

Good sanitation practices are the basis for all fly control programs and can account for as much as 75% toward the prevention of fly breeding. **Sanitation should be the first line of defense against house flies and other filth-breeding fly species.** Under optimum conditions, house flies can complete their life cycle (egg to adult) in as few as 9 days. By adhering to a strict manure management program throughout the period of greatest fly activity (i.e., the spring and summer months) it is possible to disrupt the life cycles of these pests.

- (a) Remove all manure from livestock pens as frequently as possible. Pens with calves or bulls require special attention and should be cleaned once or twice a week. Remember, a clean livestock barn has fewer fly problems.
- (b) Manure that has been removed should be spread thinly on fields or other large outside areas to facilitate rapid drying. This will help kill developing fly eggs and larvae. Another option is to stack the manure and cover **completely** with black plastic.
- (c) Eliminate silage seepage areas, wet litter, manure stacks, old wet hay or straw bales, and other organic matter accumulations that may attract flies on the farm. Wet feed remaining at the ends of mangers also will breed flies.
- (d) Provide proper drainage in barnyards. Use clean gravel and other fill to eliminate low spots in livestock yards. Proper tiling can reduce wet barnyards.

To be successful in controlling flies it is important that producers implement a control program that best fits their particular operation. Reliance on a single practice or pesticide product is not the best approach to achieving effective and economical pest control. A better approach is to combine routine sanitation with a variety of pesticide strategies such as baits, residual sprays, space sprays, and larvicides whenever flies are a problem. Do not wait for heavy fly populations to build up. It is much easier and less expensive to prevent fly populations from increasing at the beginning of the season than to attempt to control them after they have reached unacceptable density levels. As fly populations begin to increase, take time and treat as needed.

#### **Residual Sprays**

The next line of defense is residual sprays applied to the outside and inside of buildings. Other practices such as the application of larvicides, space sprays, and baits should be considered supplementary to sanitation and residual sprays. Residual sprays

## 2-2 Livestock: *Livestock Area Fly Control*

are applied to walls, ceilings, partitions, stanchions, posts, and other fly resting places. These sprays are much more effective in stanchion barns than in loose-housing, open barns where landing and resting surfaces are minimal. Also, barn surfaces vary in the amount of spray that should be applied to them. Smooth surfaces require less spray than rough, porous surfaces. Thoroughly wet the surface to the point of runoff at low pressures of 80-100 pounds per square inch. Avoid contaminating feed, drinking water, milk, milking utensils, and milk rooms. The importance of *following directions exactly according to the label* cannot be stressed enough when using any pesticide.

### Long-Term Residual Treatments

- (a) Fenvalerate [10%]. This product is labeled for use only in swine or horse buildings as a premise spray. Mix 1 quart product in 10 gal water and apply at the rate of 1 gal of spray per 750 sq ft. Remove animals before spraying. Keep animals out of treated buildings for at least 4 hours. **Do not** allow feed or drinking water to become contaminated.
- (b) Permethrin [25%]. **This product is not labeled for use in milk rooms.** Mix 6.67 oz product in 10 gal water and apply at the rate of 1 gal of spray per 1,000 sq ft. **Do not** make direct applications to animals, feed, or drinking water.
- (c) Permethrin [10%]. Mix 1 qt product in 25 gal water and apply at the rate of 1 gal of spray per 750 sq ft. Can be used in barns, dairies, feedlots, stables, and poultry houses.
- (d) Permethrin. Refer to label for directions regarding these and other permethrin products.
- (e) Tetrachlorvinphos [50%]. Follow directions according to label. Remove calves and lactating animals before spraying. Keep them out of treated buildings for at least 4 hours. **Do not** allow feed or drinking water to become contaminated. Can be used in dairy barns, poultry houses, swine buildings, and other animal buildings.
- (f) Lambda-cyhalothrin
- (g) Malathion, various formulations. See label for directions.
- (h) Beta-cyfluthrin, various formulations. See label for directions.
- (i) Gardona, various formulations. See label for directions.
- (j) Pyrethrins
- (k) Spinosad
- (l) Bifenthrin

### Medium-Term Residual Treatments

- (a) Deltamethrin [0.02%]. Controls stable flies, horn and face flies, house flies, deer flies, mosquitoes, and gnats in livestock and horse facilities. Apply thoroughly to surfaces until wet. Apply as needed, but not more than once per week. Do not spray animals or humans. Do not contaminate feed or drinking water. **Do not use in milk room or milking parlor.**

### Short-Term Residual Treatments

- (a) Dichlorvos [43.2%]. Make up a 0.5% solution by mixing 1 gal product in 100 gal water and apply diluted spray as an overall premise application. Particular attention should be given to areas where flies congregate. Animals may be present during treatment. **Do not** allow feed, water or foodstuffs, milk or milking utensils to become contaminated. Apply to cattle feedlots, stockyards, holding pens, and corrals.
- (b) Naled [58%]. Follow directions according to label.
- (c) Pyrethrins [0.1%] and piperonyl butoxide [1.0%]. Follow directions according to label. Apply as a space spray for quick knockdown and kill of house flies, stable flies, and horn flies in barns, milk rooms, and dairies.
- (d) Pyrethrins [0.5%] and piperonyl butoxide [4.0%]. Controls stable flies and other flies, mosquitoes, fleas, and wasps in livestock, dairy, hog, and poultry facilities. Close all windows and doors and apply at a rate of 2 to 3 seconds/1,000 cubic feet of area. Do not remain in treated area. Thoroughly vent treated area after 15 minutes.

## Bait Treatments

Although fresh baits will help control flies, results may be poor if fly breeding is excessive. It is suggested that baits be applied following the removal of all floor litter and manure. For best control, use baits liberally and repeat as needed. It may be necessary to increase amounts when flies are breeding heavily, but check label for proper use directions for any bait product. Baits are most effective when used in conjunction with other control measures. Do not use bait in areas where animals can slip and fall or where children may come in contact with the bait.

- (a) Methomyl [1%]. No mixing required. Bait can be used only around the outside of feed lots, broiler houses, livestock barns, and on walkways in caged layer houses. Scatter bait (do not put in piles) at rate of approximately 0.25 lb per 500 sq ft of fly feeding area, keeping 1- to 2-inch intervals between particles. **Do not** allow food-producing animals to have access to treated areas. **Do not** allow contamination of feed or drinking water.
- (b) Methomyl [1%] and (Z)-9-Tricosene [0.025%]. See label for use directions.

## Space Treatments

Space sprays or aerosols can be effective for rapid knockdown and kill of adult flies. It is important to reduce air movement as much as possible. Follow directions according to label.

- (a) Pyrethrins [0.1%] and piperonyl butoxide [1.0%]. Before spraying, close doors and windows. Apply as a fog or fine mist, directing spray toward ceiling and upper corners until area is filled with mist. Use about 0.5 oz solution per 1,000 cu ft. Allow mist to settle on animals. Leave room closed for 5 minutes after treatment, remembering to ventilate area before reoccupying. Repeat as needed. Wash teats of dairy animals before milking. Avoid breathing fumes by wearing mask or respirator of a type recommended by the U.S. Bureau of Mines.
- (b) Dichlorvos [23.4%]. Apply by fogging or misting at rate of 1 quart of 0.5% solution per 8,000 cu ft. Reduce air movement as much as possible before applying. **Do not** use in areas where animals have received a direct application within 8 hours. **Do not** allow feed, water, milk, or milking utensils to become contaminated.
- (c) Dichlorvos resin strips. Suspend from ceiling as directed on label. Use 1 strip per 1,000 cu ft. These strips work best in closed rooms. **Do not** place over water or feed. Keep strips away from animals and children.
- (d) Spinosad [2.46%]. Dilutable spray for control of stable and house flies on animal premises, including in and around poultry, beef, dairy, horse, swine, and sheep premises. **Do not** apply product in milking parlor or milk room. Mix 20 oz product per 5 gal water and apply at a rate of 1 gal solution per 500-1,000 sq ft. **Do not** use in overhead sprinkler system. Refer to label for more directions.

## Larvicides

### Oral Treatments

The use of oral larvicides such as cyromazine, tetrachlorvinphos, and diflubenzuron [9.7%], is not legal in all states. These feed additives and boluses often are not the answer to fly control unless used very extensively. All manure must be treated within an area in order to effectively reduce the fly population. In many cases the area must be very large because flies rapidly move from one herd to the next over large geographic regions.

Oral larvicides work by preventing the development of flies in manure. They are not effective against existing adult flies, and should be used in conjunction with a regular manure sanitation practice. Supplemental fly control often is needed where flies breed in manure from untreated animals or other organic sources.

- (a) Cyromazine [1%]: See Poultry section.
- (b) Diflubenzuron [9.7%]. This product is a controlled-release bolus for beef and dairy cattle that aids in the suppression of house and stable flies. Administer 1/2 bolus to cattle weighing 300-550 lb, and 1 bolus to cattle weighing 550-1,100 lb or more. **Do not** administer to cattle weighing less than 300 lbs. NEVER administer more than 1 bolus to any animal.
- (c) Tetrachlorvinphos [97.3%]. Follow directions according to label. For beef cattle and lactating dairy cattle, feed at the rate of 70 mg product/100 lb of body weight. Start feeding in early spring before flies begin to appear, and continue through the summer and fall until cold weather restricts fly activity.

## 2-4 Livestock: *Livestock Area Fly Control*

### Manure Treatments

- (a) Tetrachlorvinphos [23%] and dichlorvos [5.3%]. Mix 1 gal product in 25 gal water and apply at the rate of 1 gal of spray per 100 sq ft of droppings. Repeat at 7- to 10-day intervals until droppings begin to cone up, then treat only “hot spots” (small areas found to have large numbers of maggots). Can be used in poultry and livestock facilities. **Do not** spray animals directly. **Do not** contaminate feed or drinking water.
- (b) Tetrachlorvinphos [50%]. Apply at the rate of 1 gal of 1% solution per 100 sq ft of poultry droppings, manure piles, etc. Repeat every 7-10 days until control is achieved. **Do not** spray animals directly. **Do not** contaminate feed or drinking water.

### Mineral Mixtures and Feed Additives

- (a) S-Methoprene [10.5% and other formulations]. The AI in Altosid Cattle Custom Blending Premix is an insect growth regulator (IGR) that interrupts the development of the horn fly (and possibly other species of filth-breeding flies) in the manure of treated cattle. Begin use in the spring before horn flies appear on cattle and continue feeding until cold weather restricts horn fly activity. Product is safe for beef and dairy cattle, including breeding cattle, lactating cattle, and calves. Product can be fed up to slaughter and to lactating dairy cows without withholding milk. Refer to label for details on proper feed to weight blending ratios.

### Perimeter Area Treatments

- (a) Citric Acid and crystalized propanetricarboxylic acid [100%]. Apply 1/8 cup per sq ft of treatment area. Treatment area should have a moderately salted appearance after application. Apply every 7 days during fly season. See label for specific area applications.

## **Poultry Area Fly Control**

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There are several species of flies commonly found around caged layer poultry houses. The most common species are the house fly and the lesser house fly. Other annoying flies are blow flies (which breed on bird carcasses, broken eggs, and other garbage), soldier flies, fruit flies, gnats, and rat tailed maggots.

The house fly is by far the most important problem in caged layer operations. Not only are they a nuisance but they also are carriers of diseases. With the spread of non-farm residences into rural areas near poultry operations, egg producers are faced with increasing pressures from non-farm residents and health officials to control house flies. Also, the shift to large poultry operations has resulted in heavy concentrations of manure, a major source of fly breeding. According to workers in Georgia, as many as 1000 flies can develop in one pound of suitable breeding media. They are difficult to control, especially when the population becomes extremely high. A dedicated effort involving integrated pest management (IPM) will be needed to maintain house flies at a low level.

### **Fly Biology**

All flies pass through four life stages: egg, larva (maggot), pupa, and adult. During its life cycle, which is about 30 days, a house fly female can lay up to 1000 eggs. These eggs are deposited on moist manure or any type of moist rotten or decaying organic matter. The eggs hatch in 10-12 hours and the maggots move into the wet manure. Fly maggots mature in 4-5 days under warm moist conditions. Pupation occurs in the drier parts of manure with the adult flies emerging in 3-5 days. Under ideal conditions a house fly can complete its life cycle in 9-14 days. The life cycle can be much longer in cooler temperatures. Although capable of movement up to several miles, house flies normally move no more than one half to three quarters of a mile from their breeding sites.

## **An IPM Program to Control House Flies**

### **Step 1. Population Monitoring**

It is essential to know as early as possible which houses are the major sources of fly breeding. The simplest and quickest method of taking quantitative fly counts is the moving tape method. A roll of ordinary sticky fly tape is carefully extended full length and held by the top loop so that the cardboard carton is almost touching the floor. The operator then walks at a normal pace up and down a standardized number of rows (at least 2 full rows) holding the tape by his or her side and slightly in front. At the end of the circuit, the number of flies that have stuck on the tapes is counted and recorded on a chart. These counts should be made in each house twice a week. Population increases and decreases can then be seen and compared from each house. The problem houses can thus be determined early enough to begin supplemental control measures before the fly population gets out of control. The producer also has quantitative evidence of the progress of his or her IPM program to present to interested neighbors or health officials.

The producer has to judge, based on the population dynamics in each house, when to apply supplementary control measures (**treatment threshold**). This decision is based on application costs and the nuisance situation to the surrounding residents.

### **Step 2. Sanitation and Manure Management**

**Inside:** Manure is usually removed once a year in high-rise egg houses. It is allowed to cone up under the cages and kept as dry as possible. If at all possible, this manure should be removed during the cooler months of the year. Do not disturb the manure during the summer months. When it is spread on fields it is important to scatter the manure thinly so that the eggs and larvae are killed by drying. It is best to plow or disk it under immediately after spreading. In shallow pit houses, frequent removal of manure once or twice a week reduces fly breeding. It is important to make sure that spilled manure is not left in wet piles around the disposal equipment and in areas that the disposal equipment does not reach. If manure has to be stored, be sure to cover it completely with a heavy grade of black plastic. Cover the edges of the plastic with soil to prevent house flies from entering. House fly eggs need relative humidity levels of 90% or higher to develop successfully.

Flies normally breed in wet manure (above 40% moisture). **Leaking waterers are a major source of wet manure.** Thousands of house flies can breed in just one leaking water spot. Daily inspection and repair of all leaking waterers is essential. Provide abundant cross ventilation by the use of fans above the cages and in the manure pits, especially in hot weather.

## 2-6 Livestock: *Poultry Area Fly Control*

Outside: All garbage, leaking feed, spilled manure, bird carcasses, eggs, and miscellaneous trash should be removed regularly. Vegetation, weeds, and grass should be kept trimmed around the houses. Junk, trash, and rusting equipment which provide resting sites for flies should be removed. Install proper eave troughs and down spouts on houses to carry rain water away from buildings. Provide proper drainage in poultry yards and roadways.

### **Step 3. Biological Control**

Natural fly predators (insects and mites that actively feed on fly eggs and larvae) and parasites (small, stingless wasps that lay their eggs in and kill the pupae of house flies) can build up in manure accumulations. They can significantly reduce house fly breeding. Biological control is more effective if the sanitation and manure management as listed in Step 2 is conscientiously applied. In high-rise houses, never clean out a house completely of manure. Leave at least a fourth of the manure undisturbed so that the natural enemies can survive and move into the new manure. Biological control is not as effective in shallow-pit houses; however, if manure is kept dry, the natural enemies are more effective.

Several commercial companies sell parasites for release in poultry houses. These parasites are supposed to be self-propagating in the process of controlling flies; however, quality control of these commercially available parasites is quite variable. Often, only a small percentage of the parasites are actually alive by the time the producer receives them. Producers intending to use these parasites are advised to set aside a small sample of them to check for emergence before releasing them in the houses.

A specific biological control program for house flies in high-rise poultry houses has been developed for Virginia. A predaceous fly larva, *Hydrotaea aenescens*, is mass-reared and released, resulting in a low house fly population with a reduced need for chemical control. (For more information, see VCE publication 444-769, "Instructions on Insectary Establishment, Mass Rearing, and Release of *Hydrotaea aenescens*: a House Fly Predator")

### **Step 4. Chemical Control**

Insecticides should be used to supplement steps 2 (sanitation) and 3 (biological control). Insecticides can be used to attract and kill those flies that survived the larval stages. They should be applied so that they will not contact and kill house fly predators and parasites. Other insecticides can be used as an emergency control measure when fly populations threaten to overwhelm IPM control measures.

Fly Baits: These are designed to kill flies that have escaped the natural enemies in the manure and should be a regular part of the house fly IPM program. They are inexpensive and simple to use. They should be put out at the beginning of the fly season and renewed at least once a week through warm weather. Baits should be placed in containers (i.e., egg cartons) or glued onto cardboard panels so they will not fall into the manure pits.

Contact Sprays: If the moving tape counts indicate that the fly population in a house is threatening to overwhelm the natural controls, contact sprays can be used. As the name implies, these sprays kill flies on contact and are effective as a quick knock down treatment. Contact spray insecticides have a short residual life and will not prevent a later reinfestation. Do not spray in the manure pits or directly on the birds, eggs, feed, or water.

Residual Sprays: These insecticides have a longer residual life and can be used both inside and outside where flies congregate. In darkness, flies tend to "roost" on the upper walls and ceilings of layer houses, so residual insecticides should be concentrated in these areas. Because insecticide resistance is possible, residual sprays should be applied only to problem houses and areas where the moving tape counts indicate that the population growth is becoming serious.

### **Step 5. Feed-Through Larvicides**

When the moving tape counts indicate that the fly population is about to explode, or when equipment failure has caused a temporary build up of wet spots in the manure, application of larvicides in the feed is a practical option. It should be applied until the tape counts indicate that the flies have been significantly reduced.

These syrphid fly larvae live in highly polluted water such as livestock lagoons, polluted abandoned fish pools, foul pools, and streams associated with barnyards. The maggots are able to live in the water if sufficient solids are present as food. The adult flies resemble honey bees and are often seen "hovering" near the ground in the barnyard vicinity. Because the rattailed maggot breeds and feeds in highly polluted water, an effort must be made to keep the lagoon in optimum condition. Usually, the lagoon becomes "out-of-balance" when the water level is not in proper relationship with the solids. Never allow accumulations of manure above the water line, either floating or sticking to the sides, because these conditions promote fly development. Keep the banks steep and the weeds under control.

Use loose soil and construct a soil barrier between the milk house and the rattailed maggot source. As maggots migrate to the soil barrier, they will dig into it to pupate rather than move into the milk house.

Try to agitate the pit contents frequently during the spring and summer by pumping the pits routinely (at least once a week) to disrupt maggot development. Always maintain a waterline above the manure solids. Clean out the pit contents on a routine basis, if possible.

Usually the occurrence of rattailed maggots is a management problem directly related to improper care of the lagoon or a poorly constructed lagoon. The Environmental Protection Agency (EPA) is very concerned with run-off and over-flow leading to pollution. It is very important to coordinate with agricultural designers and Health Department officials before constructing new liquid manure tanks and lagoons. Plans are available from these agencies for constructing tanks to prevent manure seepage and polluted waters, thereby avoiding a rattailed maggot problem.

**Table 2.1 - Some Commercial Insecticides Registered for Control of House Flies in Poultry Houses**

<b>Insecticide Active Ingredient [Percent A.I. in Product] (Trade Name)<sup>1</sup></b>	<b>Mixing and Application Information</b>
<b>Fly Baits</b>	
Methomyl [1%]	Ready-to-use bait.
<b>Contact Sprays</b>	
Pyrethrins [0.1% - 0.6%] + Piperonyl Butoxide [1% 6%]	Ready-to-use oil spray; apply as mist or fog. Spray at a rate of 1-2 seconds per 1,000 cubic feet. Close windows and doors for 15 min. or double dosage if area can't be closed.
Dichlorvos [43.2%]	Mix with water as instructed on label, apply as mist or fog.
Tetrachlorvinphos [50%] walls and ceilings	Mix with water as instructed on label, apply to inside or outside
Permethrin [5.7% to 25%]	Check label for specific application instructions.
Tetrachlorvinphos [23%] and Dichlorvos [5.3%]	Check label for specific application instructions.
Dibrom 37% EC	Check label for specific application instructions.
Stirophos	Check label for specific application instructions.
Imidacloprid	Check label for specific application instructions.
Sevin	Check label for specific application instructions.
<b>Feed-Through Larvicides</b>	
Cyromazine [1%] ton of feed. Follow directions according to label.	<b>feed to egg-laying hens only.</b> Mix 1 lb product per

<sup>1</sup>Trade names are used for clarity only in this publication and do not imply endorsement of the product.

### ***Rattailed Maggots (Syrphid Fly Larvae)***

Frequently during the warm summer months, rattailed maggots are reported as a nuisance pest migrating from livestock lagoons and manure pits. These insects are not a problem as long as they remain in the liquid manure pit. However, they have been known to move out of the pit or lagoon in large numbers contaminating livestock feed, accumulating in electrical boxes causing short circuits, and congregating in stacks of egg cartons and other unwanted places. The maggots migrate in search of drier places in which to pupate.

Rattailed maggots, known as the larval or immature stage of syrphid flies, are about 1 1/4 inches long. The body portion is about 3/4 inch long and the tail portion (breathing tube) is about 1/2 inch long. These maggots are white in color and semi-transparent with the body portion being an elongated, oval, cylindrical shape. What appears to be a long tail is actually a breathing tube.

These syrphid fly larvae live in highly polluted water such as livestock lagoons, polluted abandoned fish pools, foul pools, and streams associated with barnyards. The maggots are able to live in the water if sufficient solids are present as food. The adult flies resemble honey bees and are often seen “hovering” near the ground in the barnyard vicinity. Because the rattailed maggot breeds and feeds in highly polluted water, an effort must be made to keep the lagoon in optimum condition. Usually, the lagoon

## 2-8 Livestock: *Poultry Area Fly Control*

becomes “out-of-balance” when the water level is not in proper relationship with the solids. Never allow accumulations of manure above the water line, either floating or sticking to the sides, because these conditions promote fly development. Keep the banks steep and the weeds under control.

Use loose soil and construct a soil barrier between the milk house and the rattailed maggot source. As maggots migrate to the soil barrier, they will dig into it to pupate rather than move into the milk house.

Try to agitate the pit contents frequently during the spring and summer by pumping the pits routinely (at least once a week) to disrupt maggot development. Always maintain a waterline above the manure solids. Clean out the pit contents on a routine basis, if possible.

Usually the occurrence of rattailed maggots is a management problem directly related to improper care of the lagoon or a poorly constructed lagoon. The Environmental Protection Agency (EPA) is very concerned with run-off and over-flow leading to pollution. It is very important to coordinate with agricultural designers and Health Department officials before constructing new liquid manure tanks and lagoons. Plans are available from these agencies for constructing tanks to prevent manure seepage and polluted waters, thereby avoiding a rattailed maggot problem.