

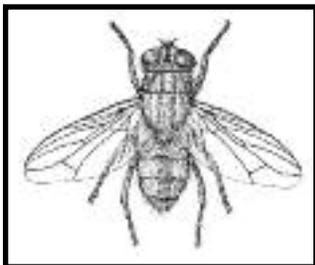
Insect Management Guidelines for Dairy Cattle and Dairies

Dairy operators face a number of management problems during the production season. One of these problems is the control of insect pests. Insect pests generally fall into two groups: insects that feed on the animal and insects associated with conditions around the dairy.

Insects That Feed on Animals

Pests such as flies, lice, and mites may occur on dairy animals at different times throughout the year. Horn flies, stable flies, and horse/deer flies and others may be found on or around dairy animals. These flies are blood feeders and occur in the warmer times of the year. Lice are generally found only in the cooler months of the year but are also blood feeders. Mites on dairy animals include mange mites, which burrow through the skin and occur in hair follicles or under scabs that form as a result of feeding. Mange mites cause a great deal of irritation to the host animal, and this irritation may result in lowered milk production or reduced growth in replacement heifers.

Horn Flies

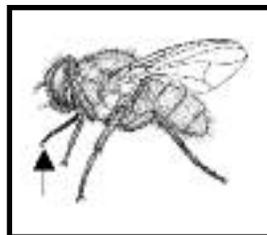


The horn fly is a small blood-feeding fly (both males and females are blood feeders) that overwinters in pastures as a pupa. They are much smaller than a house fly (see picture on next page). Adult flies emerge when springtime temperatures reach the high 60s or low 70s, and they immediately seek a host and begin feeding. Horn flies can be present

on the animal from this time until the cooler temperatures of fall and winter.

After mating, females leave the animal for short periods to lay eggs at edges of fresh manure pats. In summer temperatures, eggs can hatch in 24 hours.

Larvae feed in the aging manure for four to six days before crawling a short distance to drier areas around the manure pat to pupate. Adult emergence occurs in about three days. A cycle from egg to adult takes 8 to 10 days. There can be as many as 10 generations per year, but there are two population peaks in the year. One is in late spring to early summer and is followed by another in early fall.



Stable Flies

This fly is about the size of a housefly and is also a blood feeder (both males and females feed on blood), but

it visits a host animal only when ready to feed. Stable flies rest on barn walls, fence posts, tree limbs, or similar sites when they are not feeding.

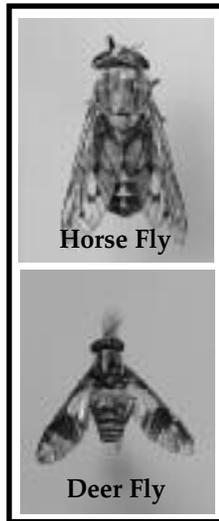
If you view the fly from the side, the tubular piercing/sucking mouthpart, called the proboscis (pronounced proh-bos-is), is very prominent. This feature distinguishes the stable fly from both the horn and housefly. House flies have "sponge-like" mouthparts as opposed to the "bayonet-like" mouthparts of stable flies. The stable fly breeds in manure, but more flies are produced in a combination of manure and hay or other decaying organic matter that produces a fermentation smell. The cycle from egg to adult is comparable to that of the horn fly at 85 °F.



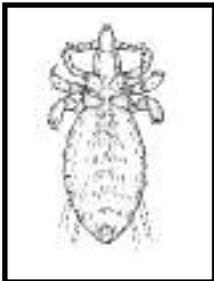
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Horse Flies/ Deer Flies

Horse flies are fairly large, heavy-bodied flies, with the larger species being about 1 inch long; most deer flies are less than ½ inch long. Horse fly wings are clear or slightly tan, while deer fly wings are patterned with brown or black spots in them. Females are found on or around cattle only when they search for a blood meal. Males are nectar feeders. Depending on species, larvae are usually found buried in mud along the sides of streams, ponds, roadside ditches, salt marshes, or the overflow areas of rice fields. A few species may develop in pasture soils or in leaf litter under trees. We don't know much about the life cycle of these flies, but in most cases, it appears there are one to three generations per year. Adults are long-lived flies and some will be present throughout the summer. These flies do not suck blood like mosquitoes but cut with their mouthparts to create a wound. As the blood flows from the wound, it is absorbed by a section of their mouthparts that is sponge-like. Horse/deer fly bites are highly irritating to the host animal. **Because these flies are highly mobile and spend little time on the animal, it is very difficult, if not impossible, to control these flies.**



Sucking Lice



Lice infestations of cattle occur generally during winter, and this added stress can result in poor growth in replacement calves or reduced milk production in adult animals. Lice may be present in very low numbers on animals during the summer months. Then reproduction increases as the weather cools in the fall, and by spring of the following year, lice numbers can be very high in uncontrolled situations. Adult males and females as well as lice in all life stages are found on the animal. Females attach their barrel-shaped eggs (nits) to the hair shafts, and it may take 10 to 14 days for eggs to hatch. Nymphs begin to feed as soon as they hatch and will feed frequently. Infestations are usually found on the head, neck, and withers or along the inner surfaces of the legs, although one species feeds at the base of the tail.

Heel Flies or Cattle Grubs

Heel flies are not as common as they were before the mid-1960s, but they still occur occasionally. Eggs are deposited on leg hairs of the host animal in the spring. The eggs hatch within two to four days, and the young larvae or cattle grubs bore into the body and migrate through the connective tissue of the host animal. The migratory process eventually ends with the formation of a warble on the back of the animal the following spring.

Approximately halfway through this process, the grubs accumulate in the esophageal area and may remain in this area for 6 to 10 weeks. This timeframe may include parts of October, November, December, and early January. It is important to apply controls before they accumulate in the connective tissue of the esophagus. If large numbers are killed in the esophagus, the byproducts of decay may compromise the health of the host animal. So treatment needs to take place before October 1.

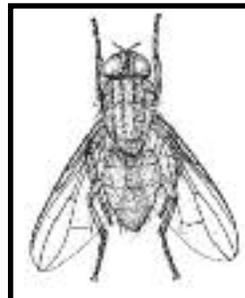
Mange Mites

Two species of mange mites may occur on dairy animals, particularly in animals in confined situations either as adults or calves. Chorioptic mange is probably the most common form of mange in cows. You may see the first lesions in the tail area and then in other parts of the body. Scabies infestations may also occur on dairy animals, but they are less common than chorioptic mange. The first lesions are usually on the head and neck and spread from this area to other parts of the body. In the case of scabies, signs usually appear as encrusted areas with thickening of the skin, which then may lead to small folds of skin on the neck. To relieve itching caused by the mites, the animal may rub against objects and loses some hair as a result. Chorioptic mange causes the skin to appear scaly with a crust formation and a thickening of the skin. In some cases, the skin may appear moist. If you suspect a mange infestation, consult with your veterinarian for diagnosis and treatment.

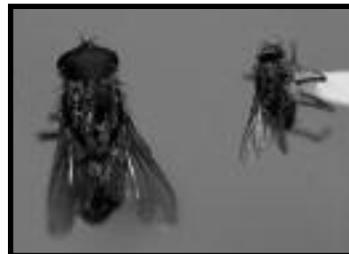
Insects Associated with the Dairy

Insects in this group do not feed on animals but are attracted to the area by manure, spilled feed, moisture, or harborage. A number of insects may fall into this category but house flies and cockroaches are the most problematic.

House Flies



Adult house flies have sponging type mouthparts. They feed by regurgitating small amounts of digestive enzymes onto the surface of the food source and then sponging up the resulting predigested liquid. House flies feed on a wide variety of foods, some of which may be in some stage of decay. Animal excrement can



**House Fly and Horn Fly
side by side**

serve as a food source or as a breeding site. These flies are prolific, and there can be 8 to 10 generations per year. Females deposit eggs on the surface of a wide range of decaying organic material, such as manure, fermenting feed, silage waste areas, lagoon overflow areas, decaying grass, or similar sites. Eggs may hatch in less than a day under opti-

mum conditions. After hatching, larvae feed for three to seven days and then seek slightly dried areas for pupation. The pupal period lasts three to four days. Newly emerged adults feed and mate, and females lay eggs within two to four days after emergence from the pupal case. When not feeding, houseflies rest on barn walls, ceilings, stall supports, fences, light wires, or various plants.

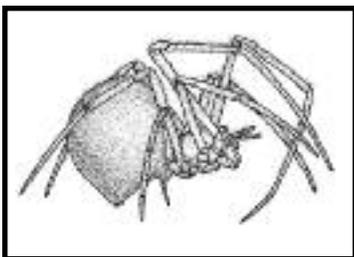
Cockroaches



Although there are several different species of cockroaches, only three are considered pests at dairies in Mississippi: the American, smoky brown, and German cockroaches. American cockroaches are about 1½ inches long and are reddish brown, while the smoky brown is 1 to 1¼ inches long and is dark brown to black.

After mating, females develop egg cases that remain attached to the body for about 24 hours. At this time, the egg case is indiscriminately dropped at some point or is glued to a surface. Egg cases contain 14 to 16 eggs for the American and 24 eggs for the smoky brown. Females of both species produce about 20 egg cases during the warmer months of the year. The German cockroach is much smaller than the other two species, measuring only about ½ to 5/8 inch long as adults. It is light brown with two dark stripes on the cap (pronotum) above the head. German cockroach females keep the egg case until the eggs are close to hatching. At this point the egg case is attached to a surface in areas frequented by the female. Each female produces four to eight egg cases, with each case containing 30 to 48 eggs. In some situations you may find German cockroaches in natural settings, but mostly you find them in buildings. You can find the American and smoky brown outside as well as in buildings. Once inside, the insects prefer warm, moist areas with an available food supply, and you may find them around pipes, hot water tanks, or sewage systems. You can find smoky browns in slightly drier areas than either the American or German. Cockroaches forage for food at night and feed on a wide variety of foods, including animal excrement, milk, milk byproducts, dead insects, fresh or dried blood, or any food that could be used for human consumption. Depending on feeding sequence, these insects might move disease organisms from one food source to the next.

Spiders



These arthropods may live around dairy barns, and although spiders do not cause any problems with livestock, their webbing may be perceived as unsanitary during inspections. Although you might argue that spiders are a

form of biological control, since they feed on insects and flies, their webs collect dust and insect body parts, which

can contaminate milk. Two spiders that might be found around barns are the house spider (see the drawing) and the long-bodied cellar spider. The house spider is small, only 3 to 5 millimeters long. As described in *How To Know the Spiders*, 3rd edition, by B.J. Kaston, "This extremely common spider is found most often in barns and houses where it makes its webs in the corners of rooms and in the angles of windows." The front part of the body is yellowish brown, while the abdomen is off-white to brown with distinctive gray striping. Long-bodied cellar spiders have an extremely long abdomen when compared to the rest of the body. They are pale yellow except for a gray area behind the eyes. Females are almost a centimeter long. These spiders spin large, irregular webs.

Mosquitoes

Mosquitoes belong to the same group of insects as the house, horn, stable, and horse flies (order Diptera), but their bodies are not as robust as these other flies. Female mosquitoes are blood feeders, and some feed primarily on birds, while others feed on many small or large mammals. Males are nectar feeders. Not only are mosquito bites irritating, but biting can also spread disease. Mosquitoes can transmit a number of diseases. The main diseases mosquitoes carry in the United States are the encephalitic viruses. These viruses are found in different bird species and are carried from birds to other birds, humans, and horses by several species of *Culex* mosquitoes. Female mosquitoes lay their eggs on or over a body of standing water. Possible water sources could be birdbaths, wading pools, pet watering containers, aquatic gardens, used tires, improperly maintained swimming pools, runoff from sewage lagoons, runoff from silage pits, temporary pooled water in tractor ruts, and any other area that might hold water for 8 to 10 days. Eggs hatch in 24 to 48 hours, and larvae feed for five to seven days before pupating. The pupal period lasts for about two days. After this, adult mosquitoes emerge and the females immediately seek out a suitable host for a blood meal.

On-Animal Insect Control

Controls for on-animal insects are largely based on using an insecticide. Depending on the active ingredient and how it is formulated, these materials may be used as pour-ons, sprays, backrubbers, ear tags, or feed additives. The table below lists some common materials you can use on lactating dairy animals. Permethrin is the primary insecticide in a high percentage of these materials, and this may present a control problem. Widespread use of this material can lead to insecticide resistance in flies, especially horn flies and house flies. If the permethrin based insecticides have been used extensively over the past several years and control seems to have declined, switch to a nonpyrethroid insecticide. Four nonpyrethroid materials are listed below: Co-ral, Ravap (organophosphate insecticides), Elector (a fermentation product), and Eprinex. If there is a high degree of resistance in the fly population, switching to a nonpyrethroid insecticide may not help, but it is the only alternative presently available. Insect growth regulators may help in cases of resistance if certain criteria are met. See the comments under Altosid.

Insect Control for Lactating Dairy Animals*

Table 1. Insecticides for use on dairy cows as sprays, back rubbers, pour-ons, dusts, feed additives, and ear tags.

Sprays

Pest	Product and Formulation	Dilution	Remarks
Horn Flies, Lice	Electer (Spinosad 2.46%)	10 oz/5 gal water	Apply 1 to 2 qt of coarse spray per animal over the body but not more often than every 7 days. Make spray applications after milking. Do not apply within 2 days of slaughter. Do not make more than 5 consecutive treatments. When treating for lice, make a second application 45 to 60 days later.
	Ravap E.C.; tetrachlorvinphos (23%) and dichlorvos (5.3%)	1 gal/200 gal water or 2 oz /3 gal water	Direct spray to thoroughly cover animal with up to 1/2 gal finished spray. Sprays may be made either before milking (allow a 20-minute delay before milking, wash teats with an approved cleaning agent, and dry) or after milking. Applications made after milking have less chance of creating problems.
	Gardstar E.C. (permethrin 40.0%)	High Pressure Spray: Spray: 30-118 ml/25 gal water Low Pressure Spray: (Hand Pump Sprayer) 118 ml/2.5 gal water	Apply 1 to 2 qt of dilution as a course spray per animal. Apply 4 to 5 fl oz per animal by spraying along the midline from the face to the tail head.
	Permethrin II (permethrin 10%)	8 oz/50 gal or 1 qt/200 gal	Apply to cover the entire animal. Do not apply more often than every 2 weeks, and if applied before milking, thoroughly wash udders before milking.
	Atroban E.C. (permethrin 11%)	1 qt/100 gal water	Apply 1 quart of diluted spray per animal. Repeat as necessary but not more often than every 2 weeks. Spray lactating animals after milking.
	A number of trade names containing pyrethrin plus piperonyl butoxide or other synergists are available. Pyrethrin concentrations may vary from 0.03% to 0.10% while the synergist concentration will vary from 0.5-1.0%		Most products of this type come as ready-to-use materials and do not require any dilution. Be sure to read and follow the label concerning application techniques.

Backrubbers

Horn Flies	Co-Ral (coumaphos 11.6%)	9 ¼ fl oz/1 gal of #2 fuel oil or #2 diesel fuel	This is a restricted-use pesticide. Place the backrubber where animals travel regularly and saturate the fiber portion with the dilution. Place high enough lactating animals can't straddle it. Apply additional dilution as needed.
	Ultra Boss (permethrin 5% and piperonyl butoxide 5%)	100 ml/gal of #2 diesel oil or mineral oil	Recharge device as needed.
	Permethrin II (permethrin 10.0%)	8 oz/gal mineral oil or nonirritating organic oil	Recharge device as needed.
	Atroban (permethrin 11.0%)	1 qt/20 gal diesel oil	Daily forced use will improve control. Recharge as necessary.

	Ravap E.C.; tetrachlorvinphos (23%) and dichlorvos (5.3%)	1 gal/25 gal of an approved backrubber-based oil.	Pour diluted solution into oil reservoir of mechanical rubbing device, or pour 1 gal per 20 linear feet of burlap or rope backrubbers.
	Permethrin II (permethrin 10%)	64 ml/gal mineral oil	Forced use will improve control. Recharge as necessary.
	Brute (permethrin 10%)	48 ml/1 gal diesel or oil	Forced use will improve control. Recharge as necessary.

Pour-ons

Horn Flies, Lice	CyLence Pour-On Insecticide	Less than 400 lb: 4 ml 400-800 lbs: 8 ml 800 lb and up: 12 ml	This is a ready-to-use material. Apply it directly along the top of the back and top of the head. Do not treat more often than once every 3 weeks. For lice control, double the amounts in the previous box. Application rate is based on the body weight of the animal.
	Permethrin CDS (permethrin 7.4% plus piperonyl butoxide 7.4%)	Moderate fly numbers Apply 1.5 ml/100 lb body weight	This is a ready-to-use product. No dilution is required when used as a pour-on. Use only with an accurate measuring container or applicator. Application rate is based on the body weight of the animal.
	Brute Pour-On (permethrin 10%)	Birth-199 lb: 2.5 ml 200-399 lbs: 5 ml 400-599 lbs: 7.5 ml 600-799 lbs: 10 ml 800-899 lbs: 12.5 ml 1000 lb and up: 15 ml	Application rates are based on body weight of the animal. Two container sizes are available-16 oz and 128 oz-and amounts per animal will vary between the two sizes. Treatment volumes given here are based on using a gallon-sized container and application with a Brute applicator gun. Follow the label if using the 16-oz container.
	Ultra Boss (permethrin 5% plus piperonyl butoxide 5%)	3 ml/100 lb body weight up to a maximum of 30 ml	Pour along the back and down the face. For optimum lice control use two applications at 14-day intervals.
	Elector (Spinosad 2.46%)	4 ml/110 lb of body weight	When used as a pour-on, use undiluted. Do not treat more often than every 14 days and do not make more than 5 consecutive treatments.
Horn Flies, Lice, and Mange Mites	Eprinex (0.5% eprinomectin)	1 ml/22 lb of body weight	This product is used in the control of gastrointestinal roundworms, as well as for sucking and biting lice and chorioptic and sarcoptic mange mites. The product will give about 7-day control of horn flies.

Dusts

Horn Flies and Lice	Python (zeta-cypermethrin 0.075% and piperonyl butoxide 0.15%)	Ready-to-Use	When used in dust bags, the bags should hang 4 to 6 inches below the back line of the cows. Forced use gives much better control. Do not use this product if you are using ear tags containing the same active ingredients.
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Feed Additives

Horn Flies	Altosid (methoprene is sold to custom feed blending companies and is available in complete feeds or in mineral mixes). The active ingredient is an insect growth regulator that is passed through the animal and is present in the manure. Concentrations in the manure interfere with the ability of the larvae to molt. Control depends on each animal's eating the specified amount of methoprene and then distributing it throughout the manure. Continue this treatment during the fly season. Some newly emerged flies may move from nearby untreated herds. These flies may drift onto your animals as they search for a host animal.		
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Ear Tags

A number of ear tags with different active ingredients are available for use on lactating dairy animals. Some of these are CyLence Ultra (beta-cyfluthrin 8%); Max-Con (cypermethrin 7%, chlorpyrifos 5% and piperonyl butoxide 3.5%); and Python Magnum (zeta-cypermethrin 10% and piperonyl butoxide 20%). Follow the manufacturer's application guidelines and use directions.

* Listed products include some of the common active ingredients, but are provided as examples only. This table includes only a few of the products available to dairy farmers for insect control. Note: insecticide registrations are constantly being changed, new ones approved, and others cancelled. Always read and follow label directions.

Premise Insect Control

Pests such as house flies, cockroaches, and spiders are attracted to dairies because of available food, water, and shelter. Although chemical controls seem to be the best first line of defense against insect pests around the dairy, nonchemical methods such as sanitation and physical methods are the most important components of managing dairy related pests. Time is an important element when operating a dairy, and some of these methods, especially sanitation, can be time consuming. But this is not a good reason to overlook these basic premises of pest control. Time spent getting rid of feeding and breeding sites means fewer flies and cockroaches, which makes chemical controls more successful if you need them.

Manure Management

There are a number of methods to remove manure from barns. You can wash it into lagoons (the most efficient method) using some type of automated system, or you can scrape it up and spread it onto pastures or stack it to spread later. As you wash, some manure may be caught on posts, building supports, in corners, or behind feeding bunkers or troughs. If you are using automated systems, you may have to do some touchup to ensure complete removal. Spreading manure in a field as thinly as possible allows the manure to dry. The drying process makes it unattractive to flies as a feeding or breeding site. Keep stacked manure below 30 percent moisture, and the dryer the better. Manure at or below 30 percent is not attractive as a breeding site for flies. Do not overlook manure in calf pens. Manure mixed with bedding can provide breeding areas for house flies and stable flies. During the fly breeding season, clean these areas as frequently as possible.

Excess Feed Removal

Dairy feeds often contain sweet materials such as molasses or brewer's yeasts, and these are very attractive to flies and cockroaches. Small amounts that may accumulate under feeding areas or in corners can provide food for flies or cockroaches. Cleaning these areas periodically helps reduce available food materials. Silage that is spilled around silos or trench bunkers also provides adult food sources as well as a breeding site for flies. Keeping spillage to a minimum and providing good drainage around trenches helps eliminate available feeding and breeding sites.

Exclusion

Preventing a pest from gaining access to an area is a reliable pest control technique. This may not work well on a dairy farm, given the constant movement of cows and personnel in and out of barns and milking parlors. But it may prove useful in specific areas, such as milk rooms. Make sure doors and windows fit well, and if windows are open, make sure screens are in place and in good shape. Cockroaches may move along water pipes within wall voids and then out into room spaces where the pipes enter the room. Caulking around pipe openings prevents the roaches from moving into the room. You can also use caulking around window and doorframes or where other service lines enter the room.

Insect Light Traps

A number of insects, including house flies, are attracted to the ultraviolet (UV) light source used in light traps (also

called black light traps). Historically, traps were fitted with the lights and an electrical grid. To reach the light source, insects had to fly through the grid where they received an electrical shock. The electrocution process often caused smaller insects to explode, sending insect body parts into the surrounding air space. This led to contamination concerns, especially in food processing areas. Many traps today are still fitted with the UV lights, but most have replaced the electrical grid with a glue board. This type of light trap is ideal for use in milk rooms. If possible, place traps 5 feet above the floor and do not allow them to be visible from the outside. Clean the trap monthly during fly season and replace the glue boards. Replace bulbs yearly, because UV bulbs may lose their attractiveness to flies long before they burn out.

Baited Traps

Cockroaches are attracted to a number of food odors, so you can use highly volatile fermenting odors in traps for these insects. One example is a homemade jar trap you can use to survey an area for cockroach populations. Or if the area is small, you might use it as a control option. To use this method, take a quart- or gallon-sized jar and coat the inner surface of the jar neck with a film of petroleum jelly. Next, place a small piece of bread in the bottom of the jar and moisten it with 15 to 20 milliliters of beer, fermenting fruit juice, or a small piece of overripe banana in the bottom. Place jars under sinks next to the wall, under or around bathroom fixtures, against walls, or around hot water tanks. Put the jars in place after cleanup at night and check the next morning. Destroy any trapped cockroaches.

Light Management

Spiders are attracted to dairy structures because of the presence of insects they eat. Insects other than flies and cockroaches are attracted to lighting that may be used around the structures at night. This may draw more spiders. If possible, reduce the amount of lighting used at night or use lighting less attractive to insects. Lighting that provides a yellow spectrum is less attractive than bright white or slightly blue light.

Physical Removal

Vacuuming has been used successfully for pest control and is a good option for removing spider webs and spiders from dairy facilities. One such backpack vacuum is called the "Lil Hummer" and is available for this purpose. Its airflow is 95 to 100 cubic feet per minute, and the static lift is 95 to 150 inches, depending on the model. The unit is fitted with a high efficiency particulate air (HEPA) filter, which greatly reduces the amount of particulate matter that reenters the air space. This would be an important asset in the milk room. With extra extensions, this vacuum can clean areas as high as 40 feet. Price may be a factor with this unit, but some of the wet/dry shop vacuums might work just as well. HEPA filters are also available for these.

You can also use a vacuum to clean up feed that might have worked its way into hard-to-reach areas around the barn. Vacuuming periodically throughout the year is much better than a "crash cleaning" just before your annual inspection.

Water Management

The presence of water determines whether you will have mosquitoes on your dairy. Anything you can do to eliminate standing water helps reduce mosquitoes. For example, using old tires to hold down coverings on silage pits provides excellent mosquito breeding sites. Drilling holes or making slits in the tires allows collected water to drain, which prevents the area from serving as a mosquito breeding ground. If mosquitoes are problems in and around the barn, you can use sprays to control houseflies and adult mosquitoes.

Insecticide Applications

After cleanup, apply insecticide to various surfaces if needed. It is much easier for insects and spiders to absorb a residual dose of insecticide from a clean surface than from one covered with dust or oily film.

When applying insecticides in the milking facility, treat each area uniquely. The facility may contain a number of different areas, including a congregating area for cows before milking, the milking parlor, the milk room, and possibly a post-milking feeding area. Before milking, the cows congre-

gate in an area next to the milking parlor, and the accumulation of manure in this area may contribute to house fly populations in other sections. Prompt removal of manure from this area helps reduce housefly numbers. After cleaning, apply residual insecticides to fly resting surfaces in this area. From the congregating area the cows move into the milking parlor. Once the milkers are attached, the milk is in a contained system and is not exposed to outside contamination sources. Two EPA-registered residual sprays list the "milking parlor" on the label, and these materials are shown in the table below. When using residual insecticides in this area, make sure teat cups, other milking equipment, and feeding stations are not contaminated with residual sprays. The milk room is considered a food processing area, and available products are limited. Rely on sanitation and/or physical methods as the primary means of pest control in this area. You can use short residual materials such as pyrethrins plus a synergist in this area, and at least one residual product, Tempo SC, has an EPA registration for food processing areas plus dairies on the label. If it becomes necessary to use any insecticide in the milk room make sure that cooling equipment and bulk tanks are protected from possible contamination.

Baits and Sprays for Barns, Milking Parlors, and Milk Rooms
Table 2. Suggested insecticides for use as premise sprays around dairy operations.
Not all products are cleared for these areas. Make sure the products you are using specifically state you can use them in milking parlors and milk rooms.

Baits

Pest	Product and Formulation	Dilution	Remarks
House Flies	QuikStrike (nithiazine 1%)	None required	This strip is a sugar-based feeding matrix that is attractive to house flies. You can put it in dairy barns or milking parlors. Placing the strip 4 to 5 feet from the floor or ground is an ideal height to attract flies, but this may not be practical.
	Quick Bayt (imidacloprid 0.50%)	See comments under remarks for dilution as a paint-on.	May be used as a scatter bait application, in bait stations (use 1 station per 250 sq ft) or as a paint-on. If you use it as a pint-on, dilute 3 lb/1 qt of warm water and stir thoroughly. Let stand for about 15 minutes, until a pasty consistency has been reached. Paint areas where flies rest. This bait is for use in dairy barns or milking parlors.

Residual Sprays

The following products are to be used around dairy barns and loafing areas. Do not contaminate food or water sources or milking equipment. **Unless otherwise stated, the sprays are not to be used in the milking parlor or milk room. Do not apply the following product concentrations directly to animals.**

Flies (also aids in control of cockroaches and spiders)	Permethrin II (permethrin 10%)	As a spray: 8 oz/6.25 gal water	Spray surfaces to runoff with dilution using 1 gal/750 sq ft.
	May be used in milking parlor.	For use in a Power Fogger: 1 ½ oz/1 gal mineral oil or other nonirritating organic oil, or water	Fog 4 oz/1,000 sq ft.
	Atroban (permethrin 11%)	1 qt/20 gal water	Spray to the point of runoff. Do not apply to vinyl or plastic surfaces.
	Ravap E.C.; (tetrachlorvinphos 23%) and (dichlorvos 5.3%)	1 gal/25 gal water	Apply 1 gallon of dilution/500–1,000 sq ft.
	Rabon (tetrachlorvinphos 50%)	2 lb/6 gal water	This dilution gives a 2-percent dilution, and you can use it on dry, whitewashed wood or concrete block surfaces. Use 1 gal of dilution/500 sq ft.

Cockroaches (If applied correctly this product provides good cockroach control.)	Tempo SC (beta-cyfluthrin 11.8%)	8 ml/some volume. (Volume will depend on the surface being treated.)	Surface type dictates the volume needed per 1000 sq ft. For example, stainless steel/ceramic tile (glazed) requires the 8 ml to be mixed in 0.2 gal (25.6 oz) of water. Unpainted plywood requires the 8 ml to be mixed in 2.7 gal and applied to 1000 sq ft of surface area. Consult label for additional surface types.
Flies	Elector (spinosad 2.46%)	20 oz/5 gal water	Use 1 gal of dilution per 500-1,000 sq ft. Spray to the point of runoff.

Aerosols for Milk Room or Milking Parlor

Pest	Product and Formulation*	Dilution	Remarks
House Flies and Cockroaches	CV-80 (pyrethrins 0.5% plus piperonyl butoxide 4%)		This is a ready-to-use aerosol. Cover milk and equipment to prevent contamination by the spray or falling insects. To apply, close windows and doors and direct spray upwards. Discharge spray for 2 to 3 seconds per 1000 cubic feet of room space. Leave room after application and ventilate before using the area.
	Clear Zone (pyrethrin 0.5% plus piperonyl butoxide 4%)		This is a ready-to-use aerosol. Cover milk and equipment to prevent contamination by the spray or falling insects. To apply, close windows and doors and direct spray upwards and in all directions. Discharge spray for 1-3 seconds per 1000 cubic feet of room space. Keep room closed for 15 minutes following treatment, and ventilate before using the facility.

*A number of other trade names containing pyrethrin plus piperonyl butoxide are available for use as described above in milk rooms. The above names are used as examples only.

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