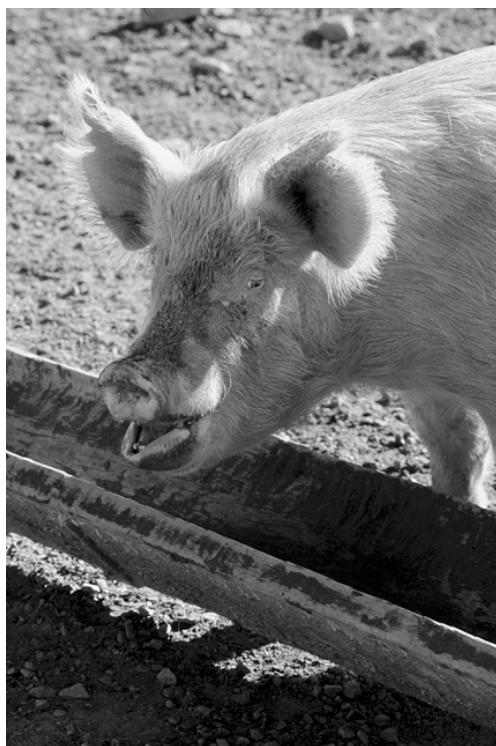


A Cornell and Penn State Cooperative Extension publication

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# Pest Management Recommendations for Sheep, Goats, and Swine



*Prepared by Phillip E.  
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College of Agricultural Sciences  
Agricultural Research and  
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# Pest Management Recommendations for Sheep, Goats, and Swine

## INTRODUCTION

Sheep and goats are susceptible to a number of annoying pests, including sheep keds (ticks), lice, sheep nose bot flies, wool maggots (fleece worms), and sheep scab (mange). Swine often encounter hog lice and mange, or itch mites. Confined livestock may be plagued by house and stable flies, while animals on pasture may encounter horse flies and deer flies. Symptoms of these pests vary from minor itching and irritation to extreme annoyance and fatigue, malnutrition, and even death. Pests also can transmit diseases and cause secondary infections.

Fortunately, many control options are available to help farmers manage sheep, goat, and swine pests. In addition to routine shearing, clipping, and cleaning, other cultural controls include practices such as appropriate manure management and stall sanitation. Chemical controls include various sprays, dips, pour-ons, and dusts. Flies are often targeted with sprays and baits/traps.

Several of the most common sheep, goat, and swine pests are described in the following sections, and management recommendations are provided for each.

## SHEEP AND GOATS—GENERAL

Sheep and goats are hosts to several important arthropod pests. Failure to control these pests may result in loss of wool, reduced weight gains, reduced milk production, and even death in young lambs. An understanding of the life history and habits of these pests is essential for effective control.

The most common and abundant external parasite of sheep is the sheep ked or sheep tick. Other pests of concern include lice, scab mites, sheep nose bot flies, fleece worms, stable flies, and house flies.

## SHEEP KEDS (TICKS)

Sheep keds, *Melophagus ovinus*, are primarily a pest of sheep, but occasionally are found on goats (Figure 1). The adult is actually a wingless fly resembling a tick in appearance. The adults are grayish-brown, six-legged, and 1/4 inch long with a broad, leathery, somewhat flattened, unsegmented, saclike abdomen covered with short spiny hairs. Unlike true ticks, keds spend their entire life cycle on the animal; however, they can crawl readily from ewes to lambs. Sheep keds can live up to 6 months, during which time the female produces about 15 young at the rate of approximately one each week. Reproduction is continuous, though slow during the winter, producing several generations a year.

Unlike most insects, the female sheep ked gives birth to living maggots, which are nourished within her body until they are fully grown. The maggots are 1/4 inch long, whitish, oval, and without legs. The skin turns brown within a few hours after birth and forms a hard puparium (case) around the larva. These cases are often called eggs, nits, or keds. Adult keds emerge from the pupal cases in 2 to 5 weeks, depending on temperature. They crawl over the skin and feed

by inserting their sharp mouthparts into capillaries and sucking blood, much like a mosquito. This results in considerable irritation, which causes the animal to rub, bite, and scratch at the wool, thus reducing the amount and quality of the fleece. The feeding punctures also cause a condition known as "cockle" in tanned skins. Hide buyers downgrade sheep skins with cockle because it weakens and discolors them. In addition, keds in large numbers can cause anemia, which can weaken the animal and make it more susceptible to other diseases.

## LICE

Several species of sucking and chewing lice infest sheep and goats. They are not normally as prevalent as sheep keds, though, and are seldom a problem in flocks that are treated for keds. The African sheep louse, sheep foot louse, and sheep body louse all suck blood from the animals, while the sheep biting louse feeds on skin scales and wool fibers.

Symptoms of lice include severe itching by the animal and rubbing on fences and other surfaces to relieve the irritation from the bites. Animals may rub and scratch until they denude areas of skin, and the wool of infested flocks becomes ragged and inferior in quality. Heavy louse populations cause anemia and make animals more susceptible to respiratory and other diseases. Lice are generally more of a problem in winter.

Distribution and abundance of these species are not well known. Eggs are attached to the hairs but can hatch even after being dislodged from the animals for several weeks. Immature and adult lice can survive for a week off the host. The eggs of the sucking lice hatch in 10 to 18 days; those of the biting louse, in 5 to 10 days. Females can begin laying eggs about 2 weeks after hatching.

## SHEEP KED AND LOUSE MANAGEMENT

Sprays, dips, pour-ons, and dusts are all effective for control of sheep keds. As a general rule, sheep should be treated in the spring after they have been shorn, when the weather is warm and the keds are most exposed. If animals are heavily infested in fall or winter months, however, it is advisable to treat them rather than allow the keds to continue to increase and cause losses. If you spray during fall or winter, select a warm, sunny day. Treat the animals in the morning, and keep them outside until they dry. To reduce the

Figure 1. Illustration of the adult sheep ked.



chances of illness, do not let wet animals crowd into a warm building. If all new bucks and ewes are treated before they are turned in with the rest of the sheep, treatment of the flock once a year will control sheep keds.

Application equipment that provides a nozzle pressure of at least 50 psi is adequate for ked and louse control on sheep. To ensure adequate and thorough dosage, do not spray more than 5 or 10 animals at a time. Confine sheep in a relatively small area so they will rub against each other and maximize the effectiveness of the materials being sprayed. Hold the spray nozzle a few inches from the wool, and spray the animals until they are thoroughly wet.

### SHEEP NOSE BOT FLIES

The female sheep nose bot fly, *Oestrus ovis* (Figure 2), deposits living larvae (maggots) in or around the nostrils of the sheep during the spring and summer months. When flies are attacking sheep, the animals bunch together and keep their noses to the ground in an effort to avoid the strikes. The larvae migrate through the nostrils (Figure 3) into the head sinuses, bronchi, or cavities in the horns or bones of the jaw or nose, where they feed on the internal secretions. Migration of the larvae irritates the nasal membranes and is often followed by secondary infections. Infested sheep shake their heads, stamp their feet, or hold their noses to the ground. Sneezing and labored breathing can be common among infested sheep. Blood flecks in the nasal discharge, and sheep banging their heads against feed bunks, fences, or the ground indicate the

Figure 2. The sheep nose bot fly.

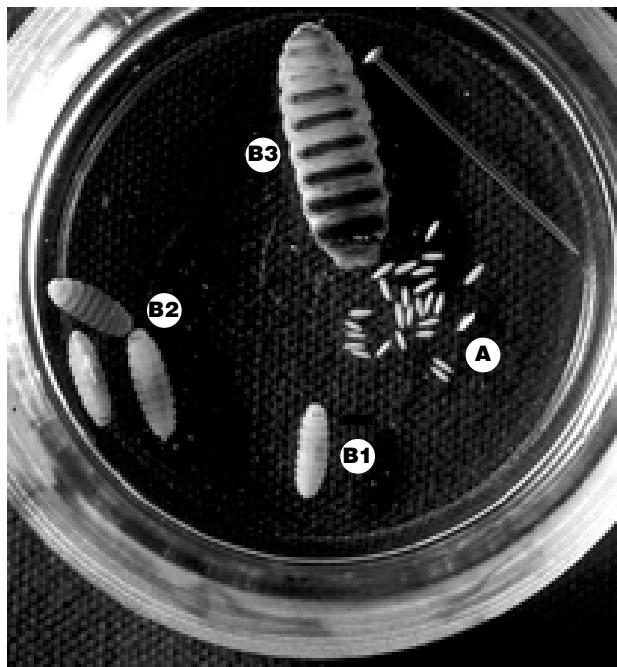
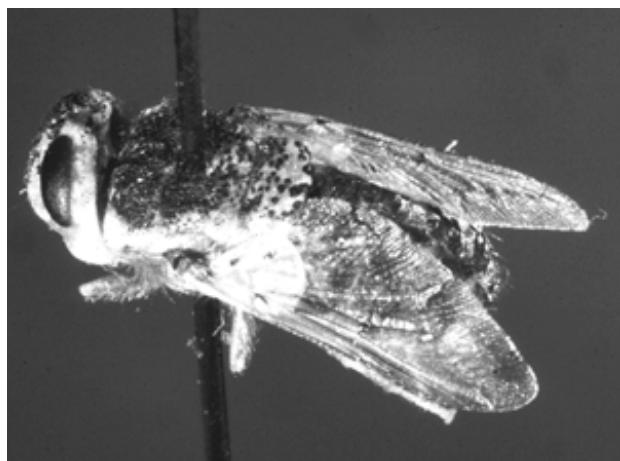


Figure 3. Sheep nose bot fly eggs (A) and three larval stages (B1-3), with a straight pin for size comparison.

presence of nose bots. Severely infested, older, or weak sheep may die as a result of the bots. The larvae develop during the winter; the following spring they are sneezed out or drop out to the ground, where they pupate and become adults.

### MANAGEMENT

A systemic oral drench treatment is currently available. Frequent change of pastures when bot flies are active may be of some help in reducing infestations, since the flies are short-lived and not capable of long flights.

### WOOL MAGGOTS (FLEECE WORMS)

Wool maggots, the larvae of blow flies, live in wet, matted, and soiled wool around the rear of the animal and in wool surrounding wounds. The eggs are deposited in dirty wool or on wounds. After hatching, the maggots spread over the animal and feed on dead tissue under the fleece. Maggot-infested sheep become restless, stamp their feet, try to bite the irritated areas, and may leave the flock to hide in secluded places. The main species are metallic flies such as *Phormia regina*, *Phormis cuprina*, and *Cochliomyia macellaria*. Fatal secondary infections often follow wool maggot attacks.

## MANAGEMENT

Control includes care and medication of wounds and early shearing, or clipping and cleaning dirty areas on the sheep before the spring blowfly season. After maggot infestation has occurred, spraying or dipping with recommended insecticides will control the maggots.

## SHEEP SCAB (MANGE)

Psoroptic mange is caused by scab mites, *Psoroptes ovis*, and is a highly contagious skin disease of sheep. State and federal quarantines and treatment apparently have eradicated the mite; however, reduced vigilance in the detection of this pest may result in outbreaks of scabies anywhere in the United States. The mites, which live in colonies on the skin surface, cause the wool to fall off and the skin to become roughened and covered with a dried crust or scab. The mites pierce the skin with their mouthparts, and scabs form over the bites when blood and serum ooze from the wounds. The areas that are usually affected include the withers, back, sides, and rump. Infested animals bite and rub continuously. Sheep with serious infestations may gradually weaken and eventually die.

Positive diagnosis can be made only by scraping lesions on the sheep with a knife and observing the mites in the scrapings. The mite is small with a white or yellow body and brown legs. Because of federal and state quarantine and treatment regulations, a veterinarian should examine animals suspected of having scabies.

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## SWINE—GENERAL

Two arthropod pests are commonly found on hogs in the Northeast; the mange or itch mite and the hog louse. Other pests of concern to the hog producer include horse flies, deer flies, stable flies, and house flies. These pests can inflict small, almost unnoticeable losses on all hogs in your herd year-round. Heavy infestations cause discomfort, weaken animals, make them more susceptible to diseases, lower their feed efficiency, and slow their growth. Sound management practices, including sanitation and chemical controls, are necessary to reduce economic losses.

## HOG LICE

The hog louse, *Haematopinus suis*, is the largest louse found in the Northeast and is the only species of louse that attacks hogs. Adults are 1/4 inch long and are dull gray-brown in color with nearly black body margins. Hog lice spend their entire life on the animal and breed continuously year-round. A few days after mating, each female lays three to six eggs per day, for a total of about 90 eggs. The eggs are glued to the hairs close to the skin and hatch in about 2 to 3 weeks. The young begin feeding immediately and reach maturity in 10 to 12 days. Lice are most common during cold weather and are found mainly inside the ears and in the skin folds of the neck and legs. Any part of the body that offers protection may harbor hog lice.

Hog lice torment the animals by piercing their skin with needle-like mouthparts and sucking blood. The resultant itching and discomfort cause the animals to scratch with their feet and to rub against feeders, posts, or any stationary objects. This causes the skin to become thick, cracked, tender, and sore. Infested animals are restless, less profitable, and more susceptible to diseases that can cause death. Hog lice may also spread the swine pox virus to pigs. A heavy infestation causes a condition on the skin similar to measles. The hair cannot be removed without skinning, so hide loss and discounted carcasses can also result.

## MANGE OR ITCH MITES

The eight-legged white or yellow mange mite, *Scarcoptes scabei*, spends its entire life cycle on the hog. This microscopic mite digs beneath the skin, creating slender winding tunnels nearly one inch long throughout the infested part of the body. The parasite dissolves the animal's tissue with its strong digestive enzymes and then sucks up this liquid. The female mite deposits eggs in the channel that she builds while feeding. Eggs hatch in 3 to 10 days, and a generation can be completed in only 2 weeks.

Areas around eyes, ears, back, and neck are most often affected. The hide becomes thick, rough, red, and pimply. The hair stands erect, and scabs may appear on the hide, especially in or near the ears. Secondary infection by bacteria may occur where the mites have burrowed. The hide of baby pigs becomes red and rough. If you see hogs scratching vigorously but you cannot find lice on them, they are probably

infested with mange mites. To make a positive identification, use a knife to scrape the infested skin surface until bleeding begins. Examine these scrapings under a magnifying glass on a dark surface. You will see the tiny mites scurrying about, if they are present.

Although some mange mites are present year-round, cooler fall and winter weather appears to promote mite reproduction. Animals in enclosed, warm buildings during winter generally have fewer mange problems.

Packing companies report that a mange-infested animal must be skinned on the killing floor, and that the hide cannot be processed for pigskin leather. The carcass must sell at a discount. The reduced weight gain and lowered feed efficiency that occur in mange-infested hogs are very difficult to measure. Suckling pigs infested with mange often develop into runts.

#### HOG LICE AND MANGE/ITCH MITE MANAGEMENT

The following program will help prevent lice and mite infestations. Because new boars, sows, or feeder pigs added to your herd may carry mites, lice, or their eggs, you should treat all hogs that are added to your herd before they come in contact with your animals. A good time to stop lice and mange is when the sows are being readied for farrowing, even though mange or lice symptoms may not be evident. If the lice and mites are controlled on the sows, they will not have a chance to move to the young pigs. This is important, since a mange infestation on baby pigs spreads rapidly, and baby pigs should not be treated with most pesticides.

If an outbreak of lice or mange is detected in your herd, treat the entire herd, even though certain individuals may appear parasite-free. Pesticide sprays recommended for control of mange or hog lice are more effective when applied at the rate of 2 to 4 quarts of finished spray per animal using high-pressure sprayers. Spray small numbers of the animals at one time and give thorough coverage with special emphasis to the head, neck, and ears. A nonfoaming detergent (0.25 lb per 25-gal spray) may be added to the spray to help maintain coverage. If cold winter weather prevents the use of sprays for treating mange or louse-infested hogs, dusts and bedding treatments are available that give varying degrees of control.

## SHEEP, GOATS, AND SWINE—PREMISE PESTS

The two principal fly pests of confined sheep, goats, and swine are house flies and stable flies.

### HOUSE FLIES

House flies, *Musca domestica*, are nonbiting insects that breed in animal droppings, manure piles, decaying silage, spilled feed, bedding, and other moist, warm decaying organic matter. Adult house flies are about 1/4 inch long and mostly dull gray in color, with four black stripes on the thorax (Figure 4). Their mouth-parts are spongelike and are used for ingesting liquid



Figure 4. The four black stripes on the thorax distinguish the common house fly.

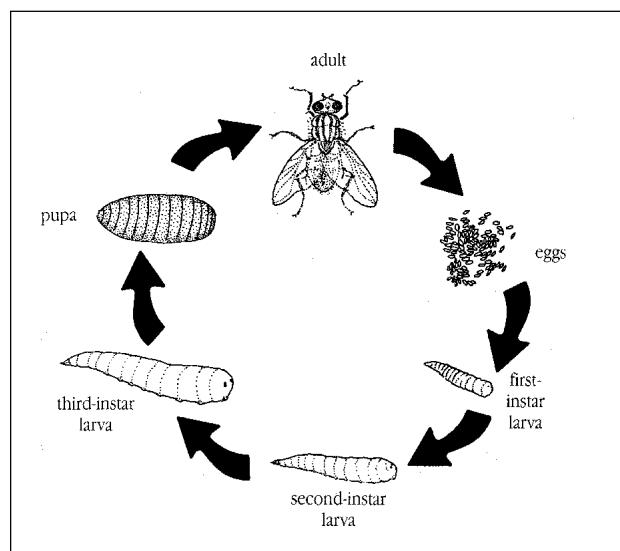


Figure 5. The house fly life cycle.

foods. Each female can produce up to six batches of 75 to 200 eggs at 3- to 4-day intervals, laying the eggs in cracks and crevices under the surface of the breeding material. Larvae (maggots) hatch from the eggs in 12 to 24 hours (Figure 5). They are white and cylindrical, tapering at the front. Maggots complete their development in 4 to 7 days, passing through three growth stages, or instars, as they grow larger. Mature larvae form a dark reddish-brown hardened case, called a puparium, from the larval skin, and then pupate. The pupal stage usually lasts 3 to 4 days, after which an adult fly emerges to complete the cycle. Generations overlap; all stages are present at the same time. The life cycle is temperature-dependent, requiring 10 days at 85°F, 21 days at 70°F, and 45 days at 60°F.

Adult flies live an average of 3 to 4 weeks, but they can live twice as long. They are most active during the day at temperatures of 80°F to 90°F and become inactive at night and at temperatures below 45°F. Resting adults can be seen inside facilities on ceilings, walls, posts, and other surfaces. Outside, they can be seen beneath roof overhangs and on walls, fences, and vegetation. Preferred resting places can be detected by the accumulation of "fly specks," light-colored spots formed from regurgitated fluid and darker fecal spots. Even though flies appear to have no direct effect on production, they are a concern to producers because they can cause public health and nuisance problems resulting in poor community relations and legal action. House fly dispersal range is 1/2 to 2 miles, but distances as great as 10 to 20 miles have been reported. Generally, flies disperse either across or into the wind, with nuisance densities highest closest to the source.

## STABLE FLIES

The stable fly, *Stomoxys calcitrans*, is a biting fly about the size of a house fly but dark gray. Its abdomen has seven rounded dark spots on the upper surface (Figure 6). The adult's piercing mouthparts protrude spearlike from under the head. Stable flies breed in wet straw and manure, spilled feed, silage, grass clippings, and in various other types of decaying vegetation. Each female lives about 20 to 30 days and lays 200 to 400 eggs during her lifetime. Under optimum conditions, an egg develops to an adult in about 3 weeks.



Figure 6. The piercing mouthparts of the adult stable fly protrude from beneath its head.

Sheep, goats, and swine are most irritated by these pests during the warm summer months. Both male and female stable flies feed on blood several times each day, taking one to two drops at each meal. Stomping of feet is a good indication that stable flies are present, since they normally attack animal legs and bellies. Production performance declines in infested herds because of the flies' painful biting activity and animal fatigue from trying to dislodge flies.

## MANAGEMENT

### *Cultural/Physical Control*

A variety of cultural control practices can be used effectively to manage house flies and stable flies.

**Practice sanitation.** The fly life cycle requires that immature flies (eggs, larvae, pupae) live in manure, moist hay, spilled silage, wet grain, etc., for 10 to 21 days. *Removing and spreading fly breeding materials weekly helps to break the cycle. Waste management is therefore the first line of defense in developing an effective fly management program.* It is much easier and less costly to prevent a heavy fly buildup than to attempt to control large fly populations once they have become established.

The main fly sources in confinement areas are animal pens. The pack of manure and bedding under livestock should be cleaned out at least once a week. In barns, the next most important fly breeding areas are the stalls, which should be properly drained and

designed to encourage complete manure removal. Wet feed remaining in the ends of troughs breeds flies and should be cleaned out at least weekly.

Spreading manure and bedding as thinly as possible will help ensure that it dries out quickly. Eliminate drainage problems that allow manure to mix with mud and accumulate along fence lines in exercise yards. Seal gaps under feed bunks where moist feed can accumulate.

**Use sticky tapes/ribbons.** Sticky ribbons, especially the giant ones, are very effective for managing small to moderate fly populations. Their only disadvantage is that they need to be changed every 1 to 2 weeks because they dry out, get coated with dust, or get "saturated" with flies.

#### *Chemical Control*

Insecticides can play an important role in integrated fly management programs. Chemical control options include space sprays, baits, larvicides, residual premise sprays, and whole-animal sprays. Space sprays, mist foggers, and baits are compatible with naturally occurring fly biological control organisms such as predators and parasitoids.

Space sprays and mist foggers provide a quick knockdown of adult flies in an enclosed air space. Because space sprays have very little residual activity, resistance to these insecticides is still relatively low.

Fly baits containing an insecticide are also very useful for managing low to moderate fly populations. Commercial traps are available, but a baited-jug trap can be made easily from a gallon plastic milk jug (Figure 7). Cut four access holes, each 2 to 2.5 inches in diameter, equidistant around the upper part of the jug, and attach a wire to the screwtop for hanging. Place about 1 oz of a commercial fly bait on the inside bottom of the jug; a bait containing the fly pheromone muscalure (Muscamente, Z-9-tricosene) is most effective. Hang the traps above animals, since scattering bait will destroy beneficial insects. Ensure that baits will not accidentally be eaten by animals or mixed into their feed.

A number of insecticides are labeled for use as larvicides, either for direct treatment of manure or in controlled-release formulations. Direct application of insecticides to manure and bedding should be avoided because of harmful effects on beneficial insects. The only exception is occasional spot treat-

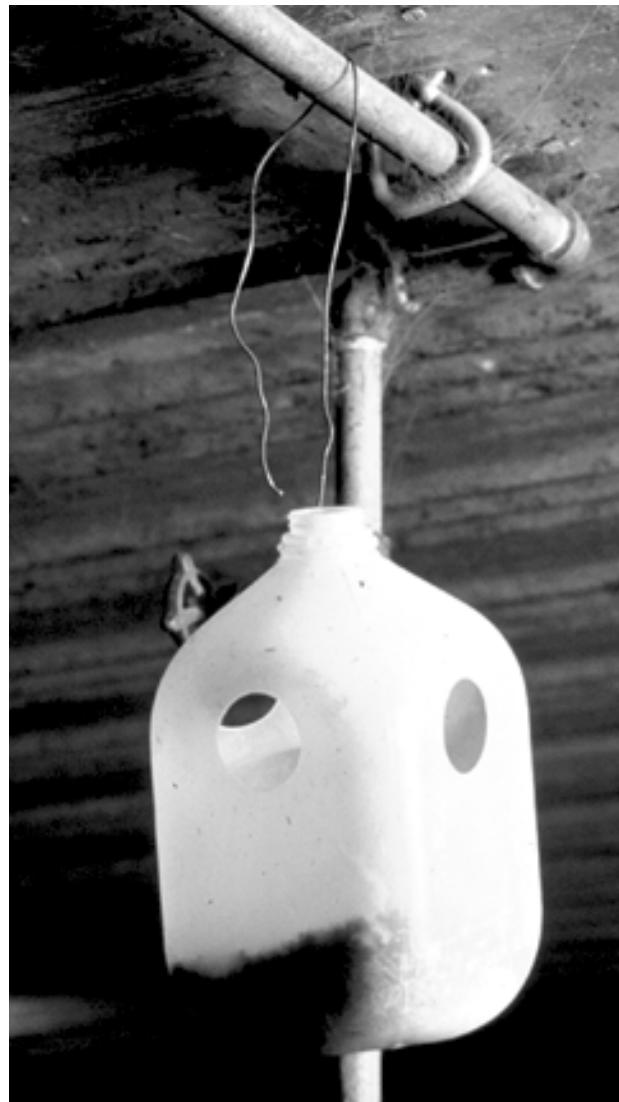


Figure 7. A one-gallon plastic milk container can serve as a baited-jug trap for flies.

ment of breeding sites that are heavily infested with fly larvae.

Treatment of building surfaces with residual sprays has been one of the most popular fly control strategies over the years. As a result, high levels of resistance to these insecticides are now very common. These materials should be used sparingly and only as a last resort to control fly outbreaks that cannot be managed using the previously mentioned tactics.

Whole-animal sprays can be made directly on the animals to manage stable fly problems. Although this approach can provide needed relief from biting fly pressure, the control is rather short-lived.

## SWINE—PASTURE PESTS

### HORSE FLIES AND DEER FLIES

Horse flies (Figure 8) and deer flies (Figure 9) belong to the fly family *Tabanidae*. They represent a complex of at least 300 species, some of which are very annoying and can inflict great pain. Swine on pasture occasionally are severely attacked by these flies, particularly on pastures that border woodlands or wet, marshy areas. Female horse flies and deer flies cut through the skin of the animal with knifelike mouthparts. They then feed on the blood that pools around the wound.

Large numbers of these flies can cause extreme annoyance and fatigue, blood loss, and reduced weight gain. Female flies typically lay their eggs in distinctively shaped egg masses on vegetation near marshes, ponds, or streams. Development from egg to adult requires 70 days to 2 years, depending on the species.

### MANAGEMENT

Horse flies and deer flies are notoriously difficult to control. They are strong fliers that move long distances between breeding areas and hosts. Because they land on host animals to feed for only a very short time, it is difficult to deliver a lethal dose of insecticide.

Moreover, because swine represent only one of the many host animals these pests feed on, treating the animals will have a negligible impact on total fly populations. Severe horse fly and deer fly pressure is generally temporary because of the seasonality of fly activity. In some cases, animals can be moved during periods of peak fly activity from low-lying pastures near marshy areas to other pastures where fly pressure is lower.



Figure 8. Adult horse flies.

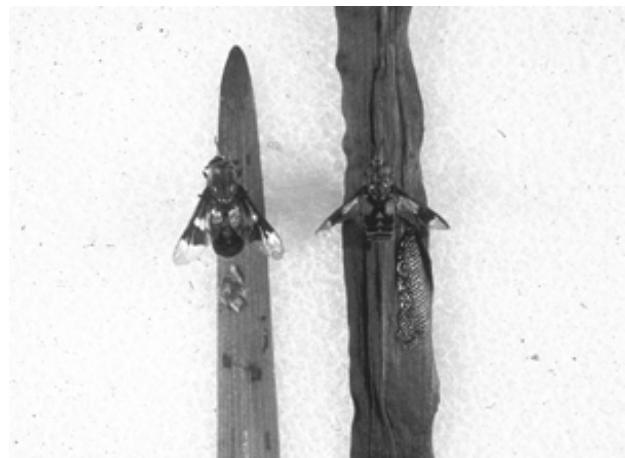


Figure 9. Adult deer flies have a distinctive pattern on their wings.

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## TIPS FOR LAUNDERING PESTICIDE-CONTAMINATED CLOTHING

- Air

Hang garments **outdoors** to air.

- Prerinse

Use one of **three methods**:

1. Hose off garments outdoors.
2. Rinse in separate tub or pail.
3. Agitate in automatic washer.

- Pretreat (heavily soiled garments)

Use heavy-duty liquid.

- Washer Load

Wash garments **separately** from family wash.

Wash garments contaminated with the same pesticide together.

- Load Size

Wash only **a few** garments at once.

- Water Level

Use **full** water level.

- Water Temperature

Use **hot** water, 140°F or higher.

- Wash Cycle

Use **normal** 12-minute wash cycle.

- Laundry Detergent

Use a **heavy-duty detergent**.

Use amount recommended on package, or more for heavy soil/hard water.

- Rinse

Use **two full warm** water rinses.

- Dry

**Line dry** to avoid contaminating dryer.

- Clean Washer

Run complete, but empty, cycle.

Use **hot water and detergent**.

---

## OTHER TIPS

- Wear a disposable coverall **over** work clothes.

- Remove contaminated clothing **before** entering enclosed tractor cabs.

- Remove contaminated clothing **outdoors** or in an entry. If a granular pesticide was used, shake clothing outdoors. **Empty pockets and cuffs**.

- Save clothing worn while handling pesticides for that use only. Keep separate from other clothing **before, during, and after** laundering.

- Wear **chemical-resistant gloves** when handling highly contaminated clothing. **Replace** gloves periodically.

- Wash contaminated clothing after **each** use. When applying pesticides daily, wash clothing **daily**.

- Rewash contaminated garments **two or three times** before reuse for more complete pesticide removal.

Tips prepared by Charlotte Coffman, Department of Textiles and Apparel, Cornell University.

Hang this information in the laundry room.

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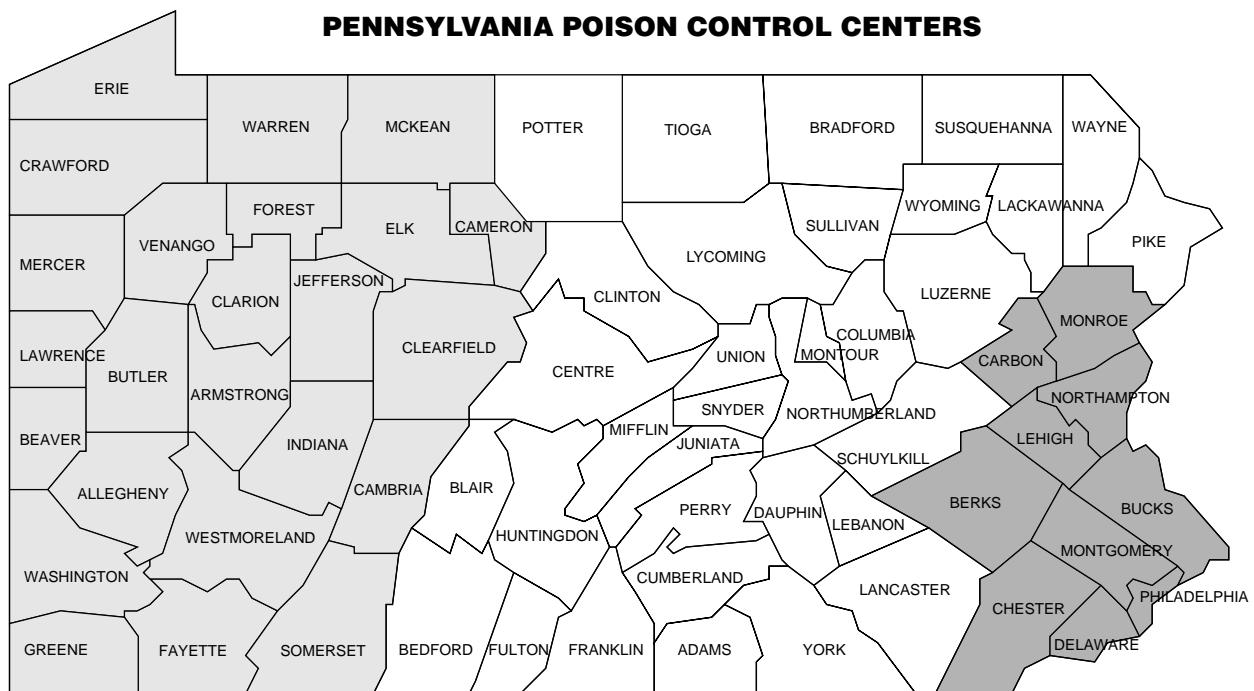
A list of pesticides registered for pest control on sheep, goats, and swine is enclosed in this pocket. **WARNING:** Always read product labels carefully before applying any pesticide; mix and apply as directed, do not overdose, do not treat too often, and follow all precautions exactly. Remember that improper practices can lead to illegal residues even when proper materials are used. It is illegal to use a pesticide in any manner inconsistent with its label.

## **INFORMATION ON SYMPTOMS AND TREATMENT OF TOXIC CHEMICAL EXPOSURE**

You can obtain prompt and up-to-date information about the symptoms and treatment of cases resulting from exposure to toxic agricultural chemicals by telephoning any of the centers listed below and asking for "Poison Control Center."

When you are unable to reach a Poison Control Center or obtain the information your doctor needs, the office of the NYS Pesticide Coordinator at Cornell University (607) 255-1866 or the Pesticide Education Program at Penn State (814) 863-0263 may be able to assist you in obtaining such information.

### **PENNSYLVANIA POISON CONTROL CENTERS**



**Pittsburgh Poison Center**  
Children's Hospital of Pittsburgh  
412-681-6669



**Central Pennsylvania Poison Center**  
The Milton S. Hershey Medical Center  
800-521-6110



**The Poison Control Center**  
Children's Hospital of Philadelphia  
800-722-7112

### **NEW YORK POISON CONTROL CENTERS**

Western New York	800-888-7655
Rochester	800-333-0542
Central and Southern Tier New York	800-252-5655
Eastern and Northern New York	800-366-6997
New York City	212-340-4494
Long Island	516-542-2323

### **PESTICIDE EMERGENCY NUMBERS**

#### **Pesticide Spills and Accidents**

CHEMTREC  
800-424-9300

#### **Pesticide Information/Emergencies**

National Pesticide Telecommunications Network  
800-858-7378

#### **Report Oil and Hazardous Material Spills**

NYS Department of Environmental Conservation  
800-457-7362  
518-457-7362