Flies are the most important insect pests of horses. Among this large, diverse group of insects, the pests of horses include bloodsucking or biting flies, filth or irritation flies, mosquitoes and bot flies.

Horses are susceptible to one or more fly pests at almost any time of the year. All flies have the same life stages which include egg, larva, pupa and the adult fly. The adult fly is the pest stage of the life cycle for most flies, but the horse bot is one of several exceptions where the fly larva is the primary pest stage.

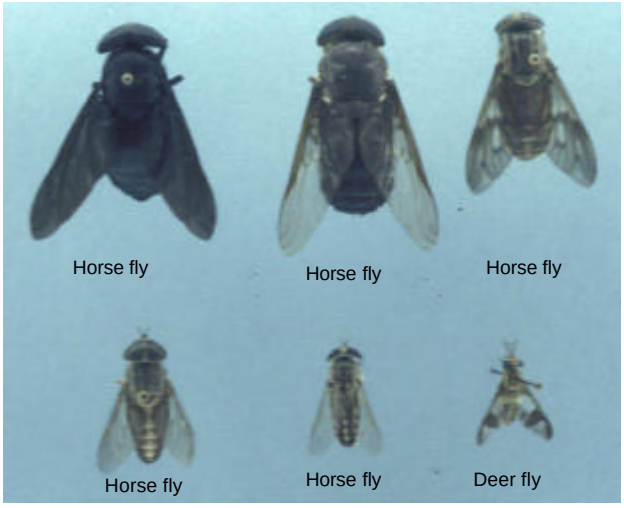
Flies that depend on livestock for their energy (food) source are the easiest to control on horses. These pests, such as the horn fly, usually spend more time on or around horses. For other fly species, such as the horse fly, only the female adult fly feeds on horses, and only a single blood meal is required for egg production. These flies are more difficult to control because they spend very little time on the animal; most of the life cycle develops independent of horses.

Tabanids: Horse Flies and Deer Flies *(multiple species)*

Description and Biology. The tabanids are a group of flies that include the deer flies and horse flies. Deer flies are the smaller flies ranging in size from 1/4 to 3/8 inch in length. They are yellow-orange with body markings and normally have patterned wings. Horse flies are a diverse group of flies ranging in length from 3/8 to 1 1/4 inch. They also vary in color, body markings and wing markings, but superficially have a similar appearance. Male tabanids never feed on animals; females feed on animals only when a blood meal is needed to support egg development. Tabanid larvae develop in aquatic and semi-aquatic environments and feed on small aquatic animals. There is usually one generation per year, but this varies somewhat among the many species.

Economic/Health Significance. Tabanids are painful biters, causing extreme annoyance and blood loss. Local reactions to the bites include dermal nodules. Tabanids mechanically transmit agents of more than 35 diseases of livestock including equine infectious anemia and M. gypseum dermatophytosis.

Control. Management is accomplished by protecting horses from adult, female flies. The frequent use of a pyrethroid-based insecticide formulated with a repellent is the most practical means of



Tabanid flies

protection. Pastures located well away from wooded areas are preferred; they reduce the incidence of tabanid problems. Most tabanid flies do not enter barns, thus stabling of horses during peak tabanid activity can also help. Using an electrified insect light trap inside the barn can help control those tabanids that do enter structures. These and other traps are not very useful outside in the open.

Tabanid fly laying eggs

Horse flies feeding on a horse's leg

Black Flies *(multiple species)*

Description and Biology. Black flies are small, 1/8 to less than 1/4 inch in length, with a characteristic humpbacked appearance. There are multiple species of black flies. They are daytime pests, but only the female fly requires a blood meal at three- to five-day intervals. The larval stage develops in moving water. Depending on the species, a mass emergence of flies can occur either once or several times each year, and outbreaks can last from two weeks to three months. Black fly swarms are usually heavier close to rivers and streams, but wind currents can move swarms many miles from their aquatic breeding habitat.

Economic/Health Significance. Black fly swarms cause extreme annoyance and intense itching. Flies feed inside the ears and on the head, neck, chest, medial thighs and abdomen. In extreme situations, hypersensitivity can develop or death may result by injection of a toxin while flies are feeding. Ears are especially sensitive to individual bites, which may cause bleeding and blood crusts. Black flies have also been implicated in the transmission of a papillomavirus that causes aural plaque.

Control. Horses must be protected during black fly outbreaks. Stabling can be effective, because black flies will usually not enter buildings. Frequent application of products formulated with an insecticide and repellent also can protect animals. Other protective methods include ear nets and the application of petroleum jelly inside the ears.


Black fly


Black fly feeding sores in horse ear

Biting Midges *(multiple species)*

Description and Biology. Biting midges are a group of flies referred to as "punkies," "no-see-ums", biting gnats or sand flies. These tiny, gnat-like flies are from 1/16 to 3/8 inch. Only the female fly takes a blood meal at three- to four-day intervals. There are many species of biting midges, and their breeding habitats are diverse. In one group of biting midges, the larvae develop in sandy or clay silt soils and the adults emerge after a rainy period. The other group breeds in a variety of habitats including water, manure and decaying vegetation. Some species have multiple generations each year. Most species of biting midges feed at night and prefer calm, windless conditions.

Biting midge

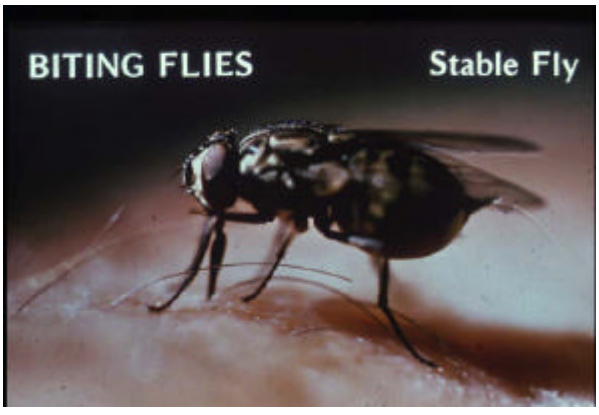
Economic/Health Significance. These flies have a very irritating bite that causes extreme itching. Biting midges are known carriers of certain diseases, plus they can induce a seasonal hypersensitivity. Itching is most severe along the base of the mane and tail and over the withers, but other areas can be affected. Because these flies are so small, they are not always recognized as the cause of the itching and irritation. Thus, it is important to associate the symptoms with the biting midge season so that the cause of the problem can be remedied.

Control. Hypersensitive horses can be treated with steroid medications, but the best way to manage the allergy is by protecting the horse from biting midges. Stabling horses provides protection. Since biting midges are minute, weak-flying insects, fans can be helpful, even in open-sided stables. Screened windows treated with a residual insecticide such as permethrin can provide a protective barrier. Open, breezy pastures are preferable to low-lying pastures surrounded by woods. Elimination of standing water and water leaks according to mosquito management recommendations can be helpful for some biting midge species.

Hypersensitivity from biting midges

Stable Fly

Description and Biology. The stable fly is a biting fly that resembles a house fly in size and color, but it can be distinguished by its prominent blood-sucking mouthparts that extend forward. Stable flies breed in decaying vegetation. The optimum habitat for larval development is hay or silage mixed with urine, water and manure. This combination can be readily found in stables and pens, and sometimes in pastures when hay is being fed. Multiple generations are produced each year in Louisiana, with the early spring months being the most active season.



Stable fly taking a blood meal

Economic/Health Significance. Both the male and female are blood feeders, and the preferred feeding sites are the legs and abdomen. Stable flies inflict a painful bite that results in blood loss and annoyance. Bite-related sores (summer sores) are also associated with this fly. Stable flies transmit agents of

several equine diseases such as equine infectious anemia virus.

Control. Fly control products containing residual insecticides and repellents can be useful in stable fly control. These materials should be directed toward the legs. Multiple applications will probably be required. Premise treatments with residual insecticides around stables and pens are also helpful. Stable flies often rest on walls or fences in sunny areas when they are not feeding on horses. Proper management and disposal of larval habitat are the most effective tools. The use of elevated hay feeders and proper management of spoiled hay and other organic debris can reduce problems in pastures.

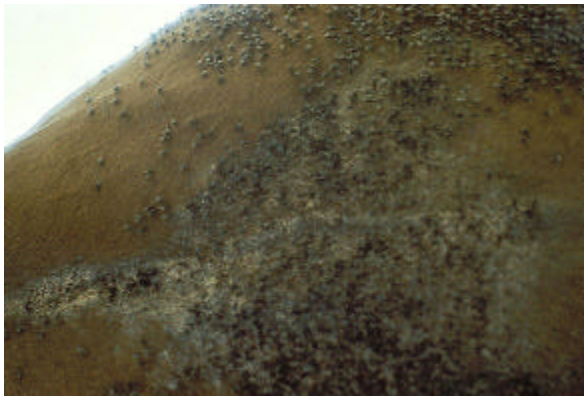
Horn Fly

Description and Biology. Horn flies are small flies, about 1/4 inch long, that spend essentially their entire adult life on the animal hosts. Horn flies breed only in fresh cow manure, so the presence of cattle in the vicinity of horses is necessary for this fly to be a problem on horses. There are multiple generations each year, and heavy populations occur in summer.

Economic/Health Significance. Both sexes are blood feeders. Horn flies feed in groups on the shoulders, neck, withers and abdomen. Horn fly feeding can be a primary cause of seasonal midline dermatitis on the belly.

Control. The horn fly is relatively easy to control on horses. Residual sprays at labeled intervals will protect adequately. Separation from cattle or effective control of horn flies on cattle can obviously reduce the problem on horses.

Horn Flies



Horn fly feeding on stomach area

Mosquitoes *(multiple species)*

Description and Biology. Mosquitoes are often an unnoticed problem on horses and other livestock. Mosquitoes are relatively small, fragile insects, and the most active feeding period for most species is the first two hours following sunset. Only the female feeds, and a blood meal is required every three to four days. Mosquito larvae develop in permanent water sources and in habitats prone to fluctuating water levels, such as ditches, low-lying areas of pastures, tree holes and containers. Multiple generations are produced each year, and the life cycle can be completed within a week during warm weather. Rainy periods or heavy rains following a drought can create explosive mosquito populations.

Economic/Health Significance. The primary impact of mosquitoes on horses is the transmission of viruses that cause diseases such as Western (WEE) and Eastern Equine Encephalitis (EEE) and the West Nile Virus. Routine vaccinations are essential for maximum protection from these diseases; mosquito control practices alone are not sufficient.

Control. Management of mosquito larvae habitats on the premise can be an important component of the overall control program. Certain insecticides, surfactants and biological control agents are labeled for treatment of standing water (aquatic larval habitat), although professional consultation is recommended to avoid harming non-target organisms. Local mosquito abatement agencies can be contacted about mosquito control off premises. On premises, drainage of standing water, troughs, cleaning of rain gutters and elimination of manmade water containers can reduce the mosquito problem. Certain predatory minnows can be stocked in water sources that cannot be drained. The use of timed over-head sprays, foggers and residual sprays to walls and other surfaces will help control adult mosquitoes. Direct treatment of horses with insecticide/repellent products can provide protection from mosquitoes, but it may not be adequate in heavy mosquito outbreaks.

Mosquito

House Fly

Description and Biology. The house fly is a non-biting filth fly about 3/8 of an inch long. House fly larvae develop in a wide variety of organic debris, although the larvae develop best in manure.

Economic/Health Significance. House flies cause considerable irritation and stress to horses by feeding on eye secretions (tears) and on wounds. House flies have been shown to mechanically transmit more than 60 animal pathogens and are associated with summer sores. In addition, large house fly populations on a horse farm or horse facility can create problems with non-agricultural neighbors.

Control. Sanitation or larval habitat management is an essential component in an effective house fly control program. Proper disposal of spoiled hay and feed, bedding and manure are necessary. Proper composting is the most effective house fly management tool, if the adequate sterilizing temperatures can be achieved in the compost structure. Chemical control strategies are complementary to habitat management, but they cannot substitute for it. The use of insecticide/repellent products applied directly to the face and neck can provide protection and control. Residual sprays applied to premise walls and other resting areas and timed space spray systems are both important components of the overall program. In addition fly baits, sticky traps and electric grids are used for fly house control. Commercially available “fly masks” or face masks attached to halters can prevent eye feeding by house flies.

House Fly: adult flies, eggs, pupae and larvae

Horse Bots and Other Flies That Cause Myiasis

Myiasis is the infestation of tissue by fly larvae. Facultative myiasis is caused by fly maggots that normally develop in carrion, but also can develop in wounds of live animals. The secondary screwworm, the black blow fly and the green or bronze blow fly are examples of fly maggots that cause myiasis on live horses. Maggot-infested wounds should be thoroughly cleansed, and infested tissue should be surgically removed. Wounds should then be treated with insecticide-containing wound ointments, followed by further supportive treatment. Repellents are helpful in the prevention of myiasis in wounds.

Cattle grubs are obligate parasites that can occasionally infest horses. Subcutaneous and dermal nodules, commonly referred to as warbles, are most commonly found in the spring and early summer and will usually be located on the back. Individual warbles can be removed surgically, but warble development can be prevented by the use of avermectin endectocides. Since cattle grub larvae migrate through the body before reaching the back, other internal complications will occasionally occur.

Horse bots are rather large flies that are bee-like in appearance. They are obligate parasites and the larval stage causes the damage. The life cycle of bot flies takes about one year. Adult flies attach their eggs to hairs of horses, and the larvae (bots) initially burrow into the lips and tongue for a few weeks, where they cause temporary irritation. The larvae then migrate to the stomach, where they grow for up to 10 months before being passed in the manure. The larvae pupate in the ground for one to two months, and then adult bot flies emerge to begin the cycle again. Overlapping generations result in extended periods of bot fly activity. Many of the endectocide treatments for internal parasites and other oral treatments will control horse bots when routinely applied.


Horse bot fly

Chemical Control

Table 1 lists the insecticides, repellents and synergists labeled for use on horses in 2005. These chemicals are the active ingredients contained in commercial products, many of which are sold over the counter at agricultural retail outlets and by veterinarians.

Insecticides kill insects, and some have additional repellent activity. Repellents, as the name indicates, only repel insects. Synergists alone have no insecticidal or repellent activity, but they can improve insecticide performance when included in the product.

Some fly control products require mixing with water, but many are sold in ready-to-use formulations. Two or more active ingredients are often combined in commercial products. For example, a product may contain one or more insecticides, a repellent and a synergist. Most insecticides listed are sold under many brand names, although different brand names may contain different concentrations or have the insecticide in combination with different active ingredients.

Table1. Insecticides, repellents and synergists for use on horses (2005).

	Trade Names	Ready-to-use Formulations	Concentrate Requires mixing
Insecticide Sprays			
Cypermethrin	(many)	Yes	No
Permethrin	(many)	Yes	Yes
Resmethrin	(many	Yes	No
Pyrethrins	(many)	Yes	No
Fenvalerate	Ectrin	No	Yes
Coumaphos	Co-Ral	No	Yes
Insecticide Dusts			
Zeta-cypermethrin	Python	Yes	No
Permethrin	(many)	Yes	No
Insecticide Feed-Through			
Tetrachlorvinophos	Rabon Oral Larvicide, Equitrol and others	Yes	No
Repellents			
Butoxypolypropylene glycol	(Stabilene)	Yes	No
Dipropyl isocinchomeronate	(MGK 326)	Yes	No
Citronella		Yes	No
Pyrethrins		Yes	No
DEET		Yes	No
Synergists			
Piperonyl butoxide		Yes	No
N-octyl bicycloheptene dicarboximide (MGK264)		Yes	No

Insecticides and repellents are sold in various forms. That is, there are several means of delivery for these chemicals to be applied to horses (Table 2). The most effective are stabilized with sunscreens and some are further stabilized by formulation in silicon-containing products. Method of application is often a critical variable. For example, wipe-on products can be more effective than other methods for application of the same insecticide and/or repellent.

Table 2. Means of delivery for insecticides and repellents for fly control on horses.

Sprays
Wound Treatment Gels/Ointments
Stabilized Sprays
Clothing Sprays
Face Lotions
Fly Collars/Leg Bands
Roll-ons (face and head)
Wipe-ons and Towelettes

Table 3. Premise treatment insecticides for fly control in and around stables and livestock barns (2005).

Premise Sprays	Fogging/ Space Sprays	Baits and Strips
Cyfluthrin (Countdown)	Pyrethrins	Methomyl (Apache, Blue Streak, Golden Malrin)
Deltamethrin (Annihilator)	Resmethrin	Imidichloprid (Quickbayt Bait and Strip)
Fenvalerate (Ectrin)	Allethrin	Muscalure
Tetrachlorvinophos (Rabon)		Nithiazine (Quickstrike strips)
Permethrin		
Tetramethrin		
Lambda-cyhalothrin (Grenade)		

Table 4. Pest management strategies for common fly pests of horses.

Management Strategy	Tabanids	Black Flies	Biting Midges	Stable Fly	Horn Fly	Mosquitoes	House Fly
Stabling	Daytime/ twilight	Daytime/ twilight	Night/twilight Fans & treated screens helpful	No	No	No	No
Exclusion devices	No	Ear nets	Fly blankets	No	No	No	Face masks
Hay & manure management	No	No	No	Especially pasture hay	No	No	General sanitation
Cattle management	No	No	No	No	Control flies on cattle	No	No
Water management	No	No	Effective for certain species	No	No	Effective for certain species	No
Restricted grazing/ movement	Allow escape from wooded areas	No	Open, breezy pasture preferred	No	No	No	No
Premise treatments with insecticides	No	No	No	Yes	No	Yes	Yes
Fly strips, traps or baits	No	No	No	No	No	No	Yes
Residual insecticides applied to horses	Partial	Yes	Yes	Yes	Yes	Yes	Yes

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