

FLIES

Glossary/Terminology

Fly Anatomical Terms

Head: Most anterior portion of the adult fly where shape and color can determine genus or species, sex, etc.

Mouthparts: Used for feeding; mostly sponging, but several forms of piercing mouthparts used for blood feeding.

Palps: Paired, leg-like sensory structures protruding from the area around the mouth parts.

Cuticle: The outer covering or skin of the fly, supple and lightly chitinized in the egg and larval stages, flexible and highly chitinized in the puparium and adult stages.

Thorax: Second of the three major anatomical divisions of the adult fly body. The place where the wings, halteres and legs are attached to the body. Stripes or coloration on the dorsal surface can be used for identification purposes.

Wings: Flies have only one pair, unlike most (but not all) other insects, which have two pair. Key aspects of wing color or venation can be used for identification.

Halteres: Found only in flies, these were formerly the second pair of wings. They have been reduced to club-like organs used for stability and guidance.

Abdomen: Third and most posterior of the three major anatomical divisions of the adult fly body. Appendage free, but shape and color can be used for identification.

Fly Life Cycle Terms

Eggs: Life cycles for most nuisance flies begin with eggs deposited within a substrate by the female flies.

Instar: One of the larval developmental stages, e.g., 1st instar, 2nd instar, or 3rd instar.

Larvae: Generally 3 larval instars in Muscidae and Calliphoridae, and from 6 to 13 in the Tabanidae (horse flies). The newly hatched larvae are in the first instar, and the last instar larvae molt to the pupal stage.

Pupa: Stage where metamorphosis to the adult stage occurs.

Posterior Spiracles: Chitinized openings where air enters the posterior portion of the body of fly larvae. Also visible on the puparium. Characteristic to species in many cases.

Puparium: Chitinized shell which encases a fly pupa.

Molting: Shedding of the cuticle during changes in stage or instar.

Eclose: To emerge, particularly as an adult from the puparium, but sometimes used to indicate hatching from the egg.

Imago: Synonymous with adult.

Categories

Nuisance Flies

Diptera, the flies, is one of the largest Orders of insects, and fortunately most of them are considered to be beneficial. The few nuisance species can be easily confused because of

the variety of sizes, shapes and color patterns. Three families having pestiferous species associated with horses worldwide are the Muscidae (house flies, stable flies, horn flies and face flies), Calliphoridae (the blow flies or bottle flies) and the Tabanidae (yellow flies, deer flies and horse flies). The conformations of most

of the pertinent Muscidae and Calliphoridae are similar to that of the house fly, with the Muscidae having generally dull, non-shiny coloration, and the Calliphoridae having metallic coloration. Exceptions exist. The Tabanidae have completely different conformations, with a variety of sizes and colors. They may or may not appear to be shiny because of their waxy surface coating, but they are not metallic. The eye colors of many tabanids are quite striking while the insects are alive, but fade to a dark gray or black after death. The female tabanids and both sexes of the stable fly are obligate blood feeders.

The flies discussed herein are all very strong fliers and can move relatively long distances in short periods. House flies and stable flies can fly 5 mph with no wind assistance. The flight speed of the other flies mentioned above has been difficult to document, but based on the size of the insects, they are probably capable of similar speeds. The mobility of these insects makes management difficult because the flies seen on the horses may be arriving from off-the-farm locations.

The few pertinent anatomical terms listed below may be encountered when reading technical articles. Definitions of other terms can be found on line.

Life Cycle

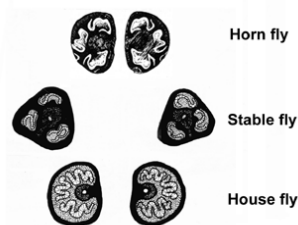
Members of the three families are found in essentially all parts of the US. The exception is the face fly, which does not penetrate into the hotter southern states. Fly activity is seasonal depending on temperature ranges suitable for adult survival and moisture levels in larval habitats. In the southern tier of states, house flies, stable flies, and horn flies can be present from almost January through December. Northern penetration during cooler months depends on annual temperature variation. The Muscidae and Calliphoridae have relatively short life cycles (6.5 days from egg to adult for house fly) and can produce many generations per year. By

contrast, the Tabanidae usually have only one generation per year. Adults of some tabanids emerge over long periods of time and are visible in the environment for many months. Other species have shorter, more defined periods when adults emerge and these can be missed or overlooked. In some locations, the sheer volume of adult tabanids present in the environment simultaneously can cause problems for horses and humans alike.

Identification and Behavior of Immature Stages

Larvae: Most of the flies seen around horses will be in the adult stage. However, maggots or larvae will sometimes be seen if there is suitable habitat in stalls or manure wagons and such. Larvae are ectotherms and control their internal temperature by finding desirable temperature ranges in their developmental media. The larvae most often found in horse manure will be house flies. These larvae are slender and white and tend to be found in groups. Larvae in compacted hay or feed in paddocks are usually stable flies. These larvae are also slender and white, but they are usually found individually in the habitat. Larvae in garbage or organic wastes might be blow flies. These are larger, cream-colored larvae and are usually found

Larval and Puparial Posterior Spiracles



Blow fly posterior spiracles

www.nadsdiptera.org

Taphonomy.wikispaces.com

grouped in large numbers. As soon as they are exposed to light, house fly and stable fly larvae attempt to burrow down into the habitat. This is not true for all blow flies, which tend to

ignore the light. These larvae can be identified by the shape of their posterior spiracles.

Horn fly and face fly females lay their eggs only in fresh cattle manure as soon as it hits the ground and larvae develop only in undisturbed



Third-instar house fly larva and young to older puparia

manure pats. Thus, these flies are produced by pastured animals, not confined animals where the manure is usually trampled into the ground. Tabanids lay their eggs in swampy, environmentally sensitive areas, and the immature stages are rarely if ever seen around livestock facilities.

Pupae: As stated above, the pupal stage where metamorphosis to the adult stage occurs. In the flies we are discussing, the actual pupa is inside of a protective puparium. However, the puparium with the pupa inside is commonly referred to as the pupa. The puparium is the last larval skin, and all of the characteristics remain. Thus, puparia can be identified by looking at the posterior spiracles. The most common puparia encountered around horses are from house flies, stable flies and possibly blow flies. Pupae are white when they first form and then turn darker with age.

Identification and Behavior of Adult Stages

Adult flies are also ectotherms and thermoregulate to maintain a desirable internal temperature range. On hot days adult flies will rest in cooler, shady areas and on cold days they will rest in the sun. Internal temperature

required for flight is generally between 60 and 65° F. Mortality increases above 90° F. After adult flies emerge from their pupae and harden off, their size does not change. Adult fly size is within a range, not a single definitive size. This makes identification difficult at first, which is why knowledge of behavior is important. Taxonomic keys for Musca and Calliphoridae can be helpful (http://www.cdc.gov/nceh/ehs/Docs/Pictorial_Keys/Flies.pdf) but identification of Tabanidae to species can be an impossible and unnecessary task. See simplified key below.

Muscidae: House flies, face flies, stable flies and horn flies can be difficult to distinguish for the uninitiated and house flies and face flies can be difficult for experts to distinguish. Links to additional information are given below, but many additional links can be found on the net.

House flies – House flies, *Musca domestica*, L., are indicative of unsanitary conditions. When on the horse, house flies can be dispersed over the body, usually imbibing moisture on the hair. In extremely dry conditions, they may cluster on the face beneath the eyes in a manner characteristic of face flies. This is usually a temporary phenomenon. House flies tend rest on surfaces and leave spots which indicate preferred resting locations. House flies will enter barns, stalls within barns and tack and feed storage rooms. Adults will feed on and lay eggs in just about any moist organic materials. Large populations of house flies can be a nuisance to the horse and move to nearby residences and business where they can become a legal problem if the source can be determined. Established flight range is 20 miles. See link for photos and more information:

http://entnemdept.ufl.edu/creatures/urban/flies/house_fly.HTM



Stable flies – Stable flies, *Stomoxys calcitrans*, L., feed on the lower legs of the horse and are only on the horse long enough to feed. Because of their painful bite, their feeding is often interrupted by defensive actions of the horse. Therefore individual flies may attempt to feed several times on several animals before they take a complete blood meal. This interrupted feeding makes for a good vector, but so far stable flies have not been shown to be very successful vectors. After feeding, stable flies rest on nearby structures, e.g., fences, to digest their meal. Stable flies do not tend to enter barns, but this is not always the case. They are only attracted to host animals for feeding and to decomposing hay, straw or feed for laying eggs. Large numbers of feeding stable flies can make it difficult to ride a horse. Stable flies can fly 5 mph and the established flight range at this time is 135 miles with weather systems. See the link for photos and more information:

<http://edis.ifas.ufl.edu/ig133>



Face flies – As the name implies, face flies, *Musca autumnalis*, De Geer, are found on the face of the animal around the eyes. Face flies can rasp the conjunctiva near the medial canthus and cause increased eye secretions. They also feed on nasal discharges. Face flies are difficult to control and can be difficult to distinguish from house flies. Unlike house flies, face flies tend to be pasture pests and do not usually frequent barns and paddock areas. See

link for photos and more information: <http://vet.entomology.cals.cornell.edu/arthropod-identification/horse-recommendations/face-flies>



Horn flies – *Haematobia irritans*, L., flies are actually a pest of cattle and have gradually adapted to using the horse as an alternate host. They can live on horse blood, but the larvae are unable to develop in horse manure. Horn flies on a horse have dispersed from nearby pastured cattle. The established flight range is 3 miles, but they will probably travel much further. The horn fly has established a very close relationship with the host and rarely leaves the host except, when the host is a cow, to lay eggs in freshly dropped cattle manure. Flies will move from one horse to another when horses are closely grouped. Male and female horn flies are obligate blood feeders and irritate the horse by intermittent feeding during the day. During cooler mornings and evenings, horn flies will be on the neck, withers and back. During warmer periods they will move to the shade in the vicinity of the ventral midline. These flies are much smaller than the other muscoid flies discussed here and their habit of staying on the host make them easy to identify. See link for photos and more information:

http://entnemdept.ufl.edu/creatures/livestock/flies/horn_fly.htm



Calliphoridae: There are numerous blow fly species in the US. Essentially all are house fly size or larger, and are metallic blue, green, bronze or blue-black. No other nuisance fly has this metallic look. Blow flies are attracted to and feed on dead flesh, food waste and other organic materials for the most part. They are present around road kills. Blow flies on an equine facility would indicate improper handling of garbage or a dead animal or other fly production source nearby, e.g., a dump. They are not usually interested in the horses unless they have untreated open sores, or there is afterbirth left after foaling. Blow flies are ever present in the environment and they will appear out of nowhere when a food source is produced. These flies are present all year round, but are more prevalent during the cooler months. Blow flies will enter barns and stalls. They do not tend to rest on horses. These flies can probably also fly at 5 mph and a flight range has not been established. See link for photos and more information: http://entnemdept.ufl.edu/creatures/livestock/flies/lucilia_sericata.htm.



Tabanidae: This is a complicated group because of the sizes and colors and behaviors and feeding activities, and because of the names given to the flies by the general public who commonly come in contact with these flies. Some states have more than 100 species. Horse owners will talk about these flies using the

common names, like greenheads, yellow flies, deer flies and horse flies. Other names may be used depending on location. In general, despite the names or the species, they are essentially impossible to control. Some of the new repellent wipes will provide limited periods of relief. In most locations, these flies are most numerous in late spring to early summer, e.g., April to May. These flies do not look like any of the flies discussed above. They can sometimes be seen resting on fences or buildings or on vehicles, but most often they immediately attack the horse. Females are obligate blood feeders, but males feed on nectar. Feeding can take place on all parts of the body and flies make persistent feeding attempts until replete. Because these flies inject an anticoagulant when feeding, sometime blood will drip from feeding sites after the flies leave. This is not a common situation in the US. These flies are fast fliers but flight ranges are unknown. See link for more information and photos:

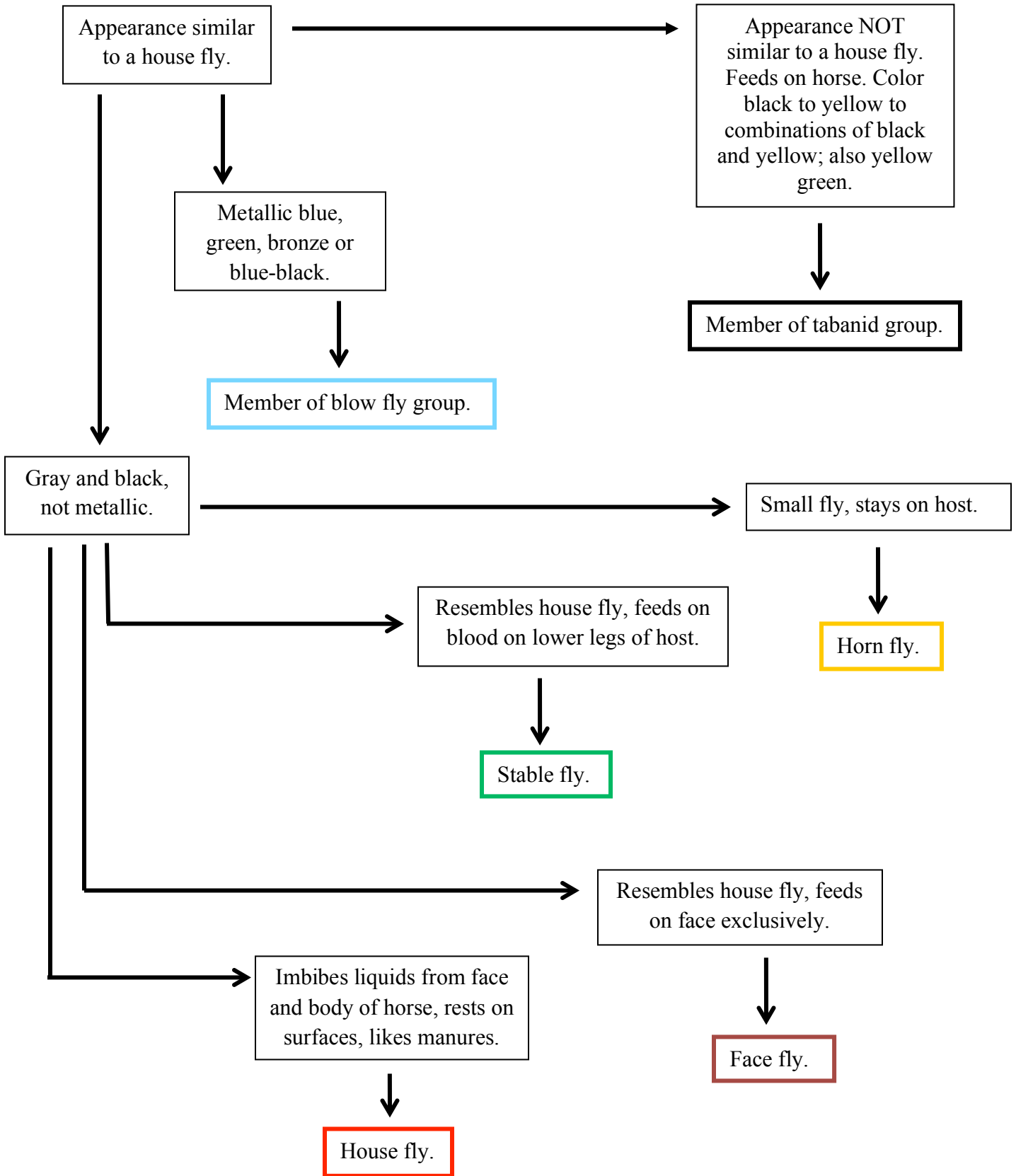
<http://en.wikipedia.org/wiki/Horse-fly>



http://entnemdept.ifas.ufl.edu/creatures/livestock/deer_fly.htm



Quick identification key



Flies as Vectors

The flies in this section can transmit various organisms, but transmission of most of the important pathogens of horses is done best by mosquitoes. Below is a summary of organisms transmitted by the Muscidae, Calliphoridae, and Tabanidae.

House fly: Capable of mechanical transfer of almost any pathogen it comes in contact with. Most significant recent finding is the fly's ability to harbor and transmit the coliform O157:H7.

Stable fly: Shown in the laboratory to transmit many pathogens, but is not very successful in the field. Is a developmental vector for the nematode, *Habronema microstoma*, to horses in the US and many parts of the world. Can mechanically transmit equine infectious anemia.

Face fly: Stimulate tear production, which is the result of damage done to ocular tissue from their feeding activity. Can transmit pathogens that cause keratoconjunctivitis, and the eyeworm, *Thelazia lacrymalis*, in horses.

Horn fly: Feeding can cause seasonal midline dermatitis. Intermediate host for the filarid nematode, *Stephanofilaria stilesi*.

Calliphoridae: Similar to house fly, but since these flies rarely contact a live animal, they are not a threat.

Tabanidae: Have been shown to mechanically transmit a number of pathogens, including the ones causing equine infectious anemia and ringworm (*Microsporum gypseum*).

Control and Treatment Measures

Although fly management may not be the reason a practitioner is present at an equine facility, fly management questions are often asked. It is important to know which flies can be managed through the various methods. Farnam (Central Life Sciences) continues to maintain the most complete line of equine

care products. However, other companies do exist and a variety of good product choices are available. Products can be found in feed stores and on line. Some links are provided for examples of product types. For pesticides, always follow label instructions. Green or natural on the label do not always mean effective. Natural repellents can be effective, but duration may be shorter than conventional repellents.

Feed-through additives for fly management are only potentially effective if flies are breeding in the manure from the horses on site being fed the additives. Face flies, horn flies and tabanids do not breed in horse manure. House flies and stable flies *can* breed in horse manure. Proper manure management can minimize this problem. Frustration occurs when flies are still present despite all of the best efforts to eliminate them. Many times this is because the flies on site have dispersed in from someplace else. This can be true for all of the flies discussed herein.

Insecticide resistance is a big problem in fly control and the affected flies are mainly the house flies and horn flies. Continued use of the same pesticide and use of long-term residual pesticides on surfaces or on animals are major causes. Most pesticides on the market are pyrethroids. If other chemical classes cannot be found for use, at least suggest rotation among pyrethroids.

Basic management methods for each nuisance fly are:

House fly – Sanitation, because of the possibility of on-site breeding, trapping, granular baits, and repellent wipes on animals. Surface residual sprays not recommended because of insecticide resistance.

Stable fly – Sanitation, because of the possibility of on-site breeding, trapping, repellent wipes on animals. Granular baits, which are sugar based, are not effective against stable flies, which are blood feeders.

Face fly – Use protective masks and on-the-animal pesticides and repellents.

Horn fly – On-the-animal pesticides and repellents are the only choices.

Tabanids – Very little management can be done. Available traps can be cumbersome to use, but effective psychological tools (<http://horse-journal.com/article/horse-pal-remains-top-fly-trap-choice-16152>). There are some repellent wipes that provide short-term relief, but pesticides are not effective. Sometimes fly populations will be lower in open pastures away from woods and marshy areas.

Sanitation implies removing stall and paddock litter and disposing of it properly. Stacking to reduce surface area is best. On facilities with small numbers of horses, covering stacks with plastic film can help reduce fly breeding. If hay is fed in paddocks, do not allow hay to be trampled into the substrate near the feeder. When enough hay accumulates, flies can develop in the hay right beneath the horses' feet. Depending on soil type, flies in substrates like hay can be found from several inches to several feet beneath the soil surface.

Traps for house flies rely on attractants with specific, but foul odors, e.g. Farnam Terminator trap (<http://www.amazon.com/FARNAM-Home-Garden-3001920-Terminator/dp/B00061MSJ4>) and bait, but traps for stable flies rely on reflectance of sun light, e.g., the KnightStick Trap (<http://www.bugjammer.com/>)

and the Olson Sticky Trap (<http://www.olson-products.com/Insect-Control-Pg--2.html>). Place traps where flies are numerous. For stable flies, place traps as close to the animals as possible.

Granular baits for house flies

<http://www.gemplers.com/product/147985/QuickBayt-Fly-Bait-5-lb-Pail-Granules>) (<http://farnamhorse.com/product.php?mainkey=200005&pid=100881&key=300002>); can be effective for fly management in localized areas where flies tend to congregate, e.g. in dead air spaces in feed storage rooms. Follow label instructions and always place baits in shallow containers, such as paper plates. Keep out of the reach of pets. **Bait strips**, such as the Quik Strike Fly Abatement Strips (<http://www.amazon.com/Farnam-Garden-Starbar-Strike-Abatement/dp/B000BWPBPG>) can be effective for long periods. Affix this device to walls about 3 feet above the floor in dead air spaces where house flies tend to congregate.

To combat any flies that enter barns, **fans** provide effective, pesticide-free protection. Flies avoid the fans because they cannot control their flight.

Ultraviolet light traps (zappers) may be helpful inside of barns. Do not place them outside or operate them after dark because they will attract and kill mostly non-target insects.

Insecticide active ingredients labeled for topical application to control house fly

Active ingredients and concentrations	Application options	Precautions
Cypermethrin 0.15% + Pyrethrins 0.20%	Spray or wipe	
Cypermethrin 1%	Spray or wipe	Do not use on foals under 3 weeks old
Permethrin 0.10% to 0.50% + Pyrethrins 0.05% to 0.20%	Spray, spot spray or wipe	Do not use on foals under 3 months old
Permethrin 0.20% + 0.13% Prallethrin	Spray	
Permethrin 0.90% + Tetramethrin 0.25% + Cypermethrin 0.10%	Spray or wipe	Do not use on foals under 3 months old
Permethrin 5% + 5% Diflubenzuron	Pour-on, Spray, or Wipe	Do not use pour-on application on foals
Permethrin 7.4% to 10%	Pour-on or wipe	Do not use on foals under 3 months old Do not ride within 24 hours of use
Permethrin 10% to 40%	Spray or wipe	Dilute before use
Permethrin 45%	Spot-on	Do not use on foals under 3 months old
Pyrethrins 0.10% to 0.40%	Spray or wipe-on	

Check the product label for treatments intervals, application rates, and precautions prior to application.

Brush animals before treatment to remove dirt and dust which can reduce insecticide effectiveness.

Be familiar with pest feeding sites and thoroughly treat areas where the pests feed. House flies are attracted to mucous discharges and wounds.

Select Ready-To-Use products with higher percentages of active ingredient for longer duration of protection or for more effective protection when pest pressure is high.

Insecticide active ingredients labeled in premise sprays to control house flies around barn and stable areas

Space spray or fogger for quick knockdown

Active ingredients	Insecticide Group Number*	Precautions and concentrations
Permethrin 10% to 40%	3	Spray when animals are absent Do not contaminate feed or water
Pyrethrins 0.10%	3	Spray when animals are absent Do not contaminate feed or water

Residual surface sprays to fly resting sites

Active ingredients	Insecticide Group Number*	Precautions and concentrations
Cyfluthrin 11.8%	3	Do not contaminate feed or water
Cyhalothrin 5.9 to 9.7%	3	Do not contaminate feed or water
Permethrin 7.4% to 40%	3	Do not contaminate feed or water
Spinosad 44.20%	5	Do not contaminate feed or water
Tetrachlorvinphos 50%	1	Do not contaminate feed or water

*Active ingredients classified in the same Insecticide Group number have the same mode of action or target site in a pest. Continued use of insecticides belonging to the same group can lead to resistance in the pest population. Rotation among groups will reduce the chance for resistance problems.

Use higher label application rates of active ingredient for longer duration of control.

Use space spray or fogger applications for rapid knockdown of high fly populations.

Insecticide active ingredients in baits labeled to control house flies

Active ingredients and concentrations	Insecticide Group Number*	Precautions
Dinotofuran 0.50%	4	
Imidacloprid 0.5% to 10%	4	
Methomyl 1.0%	1	Do not apply where animals have access.

*Active ingredients classified in the same Insecticide Group number have the same mode of action or target site in a pest. Continued use of insecticides belonging to the same group can lead to resistance in the pest population. Rotation among groups will reduce the chance for resistance problems.

Insecticide active ingredients labeled to control house fly larvae by feed-thru application

Active ingredients and concentrations	Insecticide Group Number*	Precautions
Cyromazine 2.12%	17	
Diflubenzuron 0.24%	15	

*Active ingredients classified in the same Insecticide Group number have the same mode of action or target site in a pest. Continued use of insecticides belonging to the same group can lead to resistance in the pest population. Rotation among groups will reduce the chance for resistance problems.

Stable flies and house flies breed in many sites in addition to animal manure.

Insecticide active ingredients labeled to control house fly larvae in manure and spilled feed

Active ingredients and concentrations	Insecticide Group Number*	Precautions
Tetrachlorvinphos 50%	1	

*Active ingredients classified in the same Insecticide Group number have the same mode of action or target site in a pest. Continued use of insecticides belonging to the same group can lead to resistance in the pest population. Rotation among groups will reduce the chance for resistance problems.

Apply to active fly breeding sites.

Traps: A variety of house fly traps are available. The traps do provide an effective means of monitoring fly populations, which is helpful in managing a control program, but may not result in a noticeable reduction in fly populations.

Sticky ribbons and spot cards also provide means of monitoring and documenting fly populations.

Non chemical control:

A variety of beneficial insects are attracted to horse manure where they feed on immature stages of flies. Commercial firms also supply tiny parasitoid wasps that can be effective in augmenting natural control. It is important to have a high level of sanitation to minimize potential breeding sites so that the natural enemies have a reasonable chance to succeed.

Insecticide active ingredients labeled for topical application to control horse flies and deer flies

Active ingredients and concentrations	Application options	Precautions
Cypermethrin 0.15% + Pyrethrins 0.20%	Spray or wipe	
Cypermethrin 1%	Spray or wipe	Do not use on foals under 3 weeks old
Permethrin 0.5%	Spray	
Permethrin 0.10% to 0.50% + Pyrethrins 0.05% to 0.20%	Spray, spot spray or wipe	Do not use on foals under 3 months old
Permethrin 0.50% + Pyrethrins 0.5%	Spray or wipe	
Permethrin 0.90% + Tetramethrin 0.25% + Cypermethrin 0.10%	Spray or wipe	Do not use on foals under 3 months old
Permethrin 1.0% + 0.50% Pyrethrins	Spray or wipe	Do not use on foals under 3 months old
Permethrin 5% + 5% Diflubenzuron	Pour-on, Spray, or Wipe	Do not use pour-on application on foals
Permethrin 7.4% to 10%	Pour-on, or wipe	Do not use on foals under 3 months old Do not ride within 24 hours of use
Permethrin 10% to 40%	Spray or wipe.	Dilute before use
Permethrin 45%	Spot-on	Do not use on foals under 3 months old
Pyrethrins 0.10% to 0.25%	Spray or wipe	

Check the product label for treatments intervals, application rates, and precautions prior to application.

Brush animals before treatment to remove dirt and dust which can reduce insecticide effectiveness.

Be familiar with pest feeding sites and thoroughly treat areas where the pests feed. Treat head, neck, shoulders, flanks, legs, and rump.

Select Ready-To-Use products with higher percentages of active ingredient for longer duration of protection or for more effective protection when pest pressure is high.

Some animals may be sensitive to ingredients any product, especially if the concentration of active ingredients is high. Reactions may include skin sensitivity, itchiness, rash and hair discoloration or hair loss at the application site. Bathe your horse with a mild, non-insecticidal shampoo and rinse with large amounts of water if you see signs of sensitivity. Contact your veterinarian immediately if the signs persist.

Source reduction: The larvae of most horse fly and deer fly species develop in moist semi-aquatic or aquatic areas that cannot be treated with insecticides.

Non-chemical control: Commercially available traps such as the Epps Biting Fly Trap, Greenhead / Horse Fly Trap, and Horse Pal Fly Trap can capture large numbers of flies if placed effectively. Plans for do-it-yourself traps are available on line. For example, <http://extension.missouri.edu/p/G7013> . Any flies captured in traps will not attack horses. This may suppress numbers but in areas with large breeding sites but control may not be satisfactory.

Protective fly sheets may be useful in protecting pastured horses from horse and deer flies.

Open barns and sheds provide shelters where horses can escape attack during the day.

Insecticide active ingredients labeled for topical application to control horn fly

Active ingredients and concentrations	Application options	Precautions
Coumaphos 6.15%	Spray	Cholinesterase inhibitor
Cypermethrin 0.075%	Dust	
Cypermethrin 0.15% + Pyrethrins 0.20%	Spray or wipe	
Cypermethrin 1%	Spray or wipe	Do not use on foals under 3 weeks old
Permethrin 0.5%	Spray	
Permethrin 0.10% to 0.50% + Pyrethrins 0.05% to 0.20%	Spray, spot spray or wipe	Do not use on foals under 3 months old
Permethrin 0.25%	Dust	
Permethrin 0.90% + Tetramethrin 0.25% + Cypermethrin 0.10%	Spray or wipe	Do not use on foals under 3 months old
Permethrin 1.0% + 0.50% Pyrethrins	Spray or wipe	Do not use on foals under 3 months old
Permethrin 5% + 5% diflubenzuron IGR	Spray, wipe or Pour-on	Do not use pour-on application on foals
Permethrin 7.4% to 10%	Pour-on or wipe	Do not use on foals under 3 months old Do not ride within 24 hours of use
Permethrin 10% to 40%	Spray or wipe	Dilute before use
Permethrin 45%	Spot-on	Do not use on foals under 3 months old
Pyrethrins 0.10% to 0.20%	Spray or wipe-on	

Check the product label for treatments intervals, application rates, and precautions prior to application.

Brush animals before treatment to remove dirt and dust which can reduce insecticide effectiveness.

Be familiar with pest feeding sites and thoroughly treat areas where the pests feed. Apply to back, sides, and underbelly.

Select Ready-To-Use products with higher percentages of active ingredient for longer duration of protection or for more effective protection when pest pressure is high.

Some animals may be sensitive to ingredients any product, especially if the concentration of active ingredients is high. Reactions may include skin sensitivity, itchiness, rash and hair discoloration or hair loss at the application site. Bathe your horse with a mild, non-insecticidal shampoo and rinse with large amounts of water if you see signs of sensitivity. Contact your veterinarian immediately if the signs persist.

Source reduction: Horn flies only breed in fresh cow manure so they are a problem for animals pastured near cattle.

Non-chemical control:

Protective fly sheets may be useful in protecting pastured horses from horse and deer flies.

Open barns and sheds provide shelters where horses can escape attack.

Insecticide active ingredients labeled for topical application to control face flies

Active ingredients and concentrations	Application options	Precautions
Cypermethrin 0.075%	Dust	
Cypermethrin 0.15% + Pyrethrins 0.20%	Spray or wipe	
Permethrin 0.5%	Spray	
Permethrin 0.25%	Dust	
Permethrin 0.10% to 0.50% + Pyrethrins 0.05% to 0.20%	Spray, spot spray or wipe	Do not use on foals under 3 months old
Permethrin 0.20% + 0.13% Prallethrin	Spray	
Permethrin 0.90% + Tetramethrin 0.25% + Cypermethrin 0.10%	Spray or wipe	Do not use on foals under 3 months old
Permethrin 1.0% + 0.50% Pyrethrins	Spray or wipe	Do not use on foals under 3 months old
Permethrin 5% + 5% Diflubenzuron	Pour-on, Spray, or Wipe	Do not use pour-on application on foals
Permethrin 7.4% to 10%	Pour-on or wipe	Do not use on foals under 3 months old Do not ride within 24 hours of use
Permethrin 10% to 40%	Spray or wipe	Dilute before use
Permethrin 45%	Spot-on	Do not use on foals under 3 months old
Pyrethrins 0.10% to 0.4%	Spray or wipe-on	

Check the product label for treatments intervals, application rates, and precautions prior to application.

Brush animals before treatment to remove dirt and dust which can reduce insecticide effectiveness.

Be familiar with pest feeding sites and thoroughly treat areas where the pests feed. Apply to face and around eyes, being careful not to get product in the eyes. Face flies also may feed at wounds.

Select Ready-To-Use products with higher percentages of active ingredient for longer duration of protection or for more effective protection when pest pressure is high.

Some animals may be sensitive to ingredients any product, especially if the concentration of active ingredients is high. Reactions may include skin sensitivity, itchiness, rash and hair discoloration or hair loss at the application site. Bathe your horse with a mild, non-insecticidal shampoo and rinse with large amounts of water if you see signs of sensitivity. Contact your veterinarian immediately if the signs persist.

Source reduction: Face flies only breed in fresh cow manure so they are a problem for animals pastured near cattle.

Fly masks can provide protection against aggravation by face flies.

Insecticide active ingredients labeled for topical application to control biting/ non-biting gnats (Black flies, No-see-ums, eye gnats, etc.)

Active ingredients and concentrations	Application options	Precautions
Cypermethrin 0.075%	Dust	
Cypermethrin 0.15% +Pyrethrins 0.20%	Spray or wipe	
Cypermethrin 1%	Spray or wipe	Do not use on foals under 3 weeks old
Permethrin 0.5%	Spray	
Permethrin 0.10% to 0.50% + Pyrethrins 0.05% to 0.50%	Spray, spot spray or wipe	Do not use on foals under 3 months old
Permethrin 0.20% + 0.13% Prallethrin	Spray	
Permethrin 0.90% + Tetramethrin 0.25% + Cypermethrin 0.10%	Spray or wipe	Do not use on foals under 3 months old
Permethrin 1.0% + 0.50% Pyrethrins	Spray or wipe	Do not use on foals under 3 months old
Permethrin 0.9% + Tetramethrin 0.25% + Cypermethrin (0.10%)	Spray or wipe-on	Do not use on foals under 3 months old
Permethrin 5% + 5% Diflubenzuron	Pour-on, Spray, or Wipe	Do not use pour-on application on foals
Permethrin 7.4% to 10%	Pour-on, paste or wipe	Do not use on foals under 3 months old Do not ride within 24 hours of use
Permethrin 10% to 40%	Spray or wipe	Dilute before use
Permethrin 45%	Spot-on	Do not use on foals under 3 months old Suppression only
Pyrethrins 0.10% to 0.20%	Spray or wipe-on	

Check the product label for treatments intervals, application rates, and precautions prior to application.

Brush animals before treatment to remove dirt and dust which can reduce insecticide effectiveness.

Be familiar with pest feeding sites and thoroughly treat areas where the pests feed. Black flies - wipe the inside of the ears, under chin, throat and midline of belly. Biting midges (Culicoides – nose-ums) feed on back, sides and the underbelly, which is difficult to protect with insecticides or repellents. Eye gnats - apply to face and around eyes, being careful not to get product in the eyes.

Select Ready-To-Use products with higher percentages of active ingredient for longer duration of protection or for more effective protection when pest pressure is high.

Some animals may be sensitive to ingredients any product, especially if the concentration of active ingredients is high. Reactions may include skin sensitivity, itchiness, rash and hair discoloration or hair loss at the application site. Bathe your horse with a mild, non-insecticidal shampoo and rinse with large amounts of water if you see signs of sensitivity. Contact your veterinarian immediately if the signs persist.

Source reduction: Black flies breed in flowing water of streams and rivers. Biting gnats develop in moist semi-aquatic or aquatic areas including treeholes, seepage areas, and other sites that are unknown or so diffuse that it is impractical to eliminate or treat them.

Black flies generally feed during daylight and are most problematic in the spring. Providing shelter or keeping horses up when populations of these flies are high may be a practical way of providing protection.

Ear nets can be used to protect against ear feeding by black flies.

Protective fly sheets may be useful in protecting pastured horses from biting gnats.

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