Flies and External Parasites of Horses

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Insects and related pests have a significant financial impact on the horse industry. It is estimated that more than $270 million is spent every year to control them; furthermore, insect-borne diseases, such as equine infectious anemia and encephalitis, result in additional annual losses of more than $150 million. Additionally, these diseases not only take their toll in economic terms; they also threaten the health of humans.

Arthropods can damage horses directly and indirectly. They suck blood, feed on mucous discharges from horses and spread disease. They also cause digestive interference which results in poor growth of the horse. Some adult flies even frighten horses enough to cause injury, whereas other flies feed on the inside of horses' ears to such an extent that their ears become so raw it is difficult to halter them.

A sound knowledge of the biology, life history and habits of the pest species which attack horses is helpful when establishing control programs. Each pest species will be discussed and basic information on prevention management and control presented.

Flies Affecting Horses

Flies are among the most persistent pests of horses. Adult flies have only one pair of wings and their life cycle includes four stages: egg, larva, pupa and adult. In and around stables and barns, the predominant fly species are house flies and blood-sucking stable flies. In pastures, face flies and horn flies can be a problem, especially if cattle are in the vicinity. Other fly species that attack horses in pastures include horse flies and deer flies, black flies and other gnats, and mosquitoes.

House flies *(Musca domestica)* are of concern to both horses and people. They are not "obligate parasites;" that is, they can live away from host animals. Still, they may annoy horses, people and other animals. When house flies alight on a surface, they usually deposit a vomit droplet with their sponging mouthparts along with a fecal drop. Therefore, large populations can serve in the mechanical transmission of many harmful microorganisms. In addition, adult house flies can act as intermediate hosts for the *Habronema* species of stomach worms in horses.

House flies develop as larvae in almost any decomposing organic matter, such as feces, garbage, straw, hay, silage and greenchop. Horse dung is an excellent breeding medium. A complete life cycle of the house fly is relatively short, requiring between 1 and 2 weeks during the summer. If not controlled, house flies can establish very large populations quickly.

Bloodsucking **stable flies** *(Stomoxys calcitrans)* are among the most severe fly pests. They resemble house flies, but have rigid piercing/sucking mouthparts projecting forward from underneath their heads. Both male and female stable flies feed on blood. **Stable flies** prefer to feed on horses' legs, with the lower legs and flanks supporting the largest populations. Their bite is painful to horses, and horses stamp and kick to try to

dislodge feeding stable flies. Large numbers of stable flies can cause severe dermatitis, possible infection and secondary effects from blood loss as well as fractured leg bones due to the horse stomping.

Stable flies are more restricted in breeding habitat than are house flies. They prefer rotting hay or straw mixed with horse or cattle feces or urine. Horse dung accumulated in stalls or stables and subsequently wet with urine or water offers a good breeding environment. Decomposing straw, silage, grass clippings, rotting round hay bales and similar material are suitable for **stable fly** breeding, even without feces or urine.

The life cycle of **stable flies** is longer than that of house flies. **Stable flies** need 3 to 4 weeks to program from egg to adult. Adult females need a separate blood meal before laying each batch of eggs and can produce as many as 20 batches of 50 eggs each. Such reproductive potential means stable fly populations can build quickly during the summer months.

In pasture conditions, several other flies can be troublesome to horses. **Face flies** *Musca autumnalis)* can be severe pests, especially on horses kept near cattle, their principal host. Very similar in appearance to house flies, face flies, particularly females, use their sponging mouthparts to feed on the mucous secretions from horses' eyes and nostrils. **Face flies** also feed readily on blood from wounds or from bites of bloodsucking insects such as horse flies. Female face flies oviposit their eggs only in very fresh cattle manure. The entire life cycle takes from 15 to 25 days, depending on temperature.

Horn flies *(Haematobia irritans)* are bloodsucking pests that are also usually pests of cattle. **Horn flies** will feed on horses if they are pastured or ridden near infested cattle. Horn flies are only about half the size of face flies and are commonly found on the back, sides and belly of cattle and horses. These flies remain on the host animal day and night, leaving only to transfer to other animals or to lay eggs. Like face flies, horn flies breed only in freshly deposited cattle manure. Their life cycle can be as short as 10 days in hot, humid weather. **Horn flies** are not known to transmit any diseases of horses.

Well known to all horse owners are bloodsucking **horse flies** and **deer flies**. These heavy-bodied, brown to black flies with iridescent greenish eyes are swift fliers and vicious biters. Only females bite, and they cause considerable pain as they feed. They are from one-third to one inch long, and the wings vary from clear to striped to smoky black. There are many different species of these flies.

Horse and **deer flies** feed by piercing the horse's skin with their bayonet-like mouthparts and then lap up the blood as it seeps from the wound. Because the pain motivates host animals to dislodge the feeding flies, it is often necessary for horse and deer flies to make many wounds before obtaining a full blood meal. This in turn promotes blood loss and possible anemia in the host. These flies feed only during daylight hours, and each species seems to have preferred feeding sites on the host's body. Horse flies have been implicated in transmission of equine infectious anemia (EIA).

Most **horse flies** and **deer flies** produce only one generation per year. The female lays her eggs on vegetation around moist, wet places. After hatching, the larvae burrow into the mud where they spend the next year feeding on small animals such as earthworms, insects and small crustacea. They pupate in the spring and emerge as adults by early summer.

Mosquitoes feed on pastured horses and can cause extreme annoyance. Often, mosquitoes go unnoticed because most feed mainly at dusk. **Mosquitoes** breed in standing or slow-moving water such as swamps, ditches and flood waters. Other breeding sites include tree holes, cisterns, gutters, watering tanks, cans, bird baths and old tires that hold water. The life cycle of mosquitoes can be completed in 10 to 14 days under good conditions.

Large populations of **mosquitoes** can adversely affect horses. Their bite is irritating, and horses under constant attack can suffer significant blood loss. In addition, mosquitoes may carry several important encephalitis that affects both horses and people. These viral diseases cause inflammations of the brain and include such diseases as Eastern Equine Encephalitis, Western Equine Encephalitis and Venezuelan Equine Encephalitis. Without annual vaccinations, these diseases are often fatal to horses and are frequently severe in people. **Mosquito** species vary in their ability to transmit encephalitis viruses.

Another group of flies that can be annoying to horses are **black flies**, also known as **buffalo gnats** because of their humpbacked appearance. **Black flies** are small and dark and often swarm about the faces of people and livestock. Pastured horses are vulnerable to these day-feeding pests. Most **black fly** species develop in swift-moving, clean streams. Adults emerge from spring through fall and, depending on the species, usually within a short time period. In horses, black flies usually feed on inside ear folds. This feeding activity makes ears bloody and sore, predisposes horses to secondary infections and invitations, and frequently causes horses to become head shy. Occasionally, black flies may also be found feeding on horses' bellies.

Biting midgets *(Culicoides sp.)*, often called "**punkies**" or "**no-see-ums**" can also be a nuisance to horses. These small flies are of regional importance in the United States, primarily in the coastal states, with the greatest problems occurring in the South. Dense numbers feed on horses and their painful bites cause horses to become nervous. Other gnats, such as *Hippelates* sp. **eye gnats**, can be a nuisance by feeding around faces and open wounds of horses.

Fly Control

House flies and stable flies have three prerequisites for successful completion of their life cycles: **appropriate breeding materials**, **optimum moisture**, and **adequate warmth**. Eliminating any of these factors will minimize fly breeding. A successful control program therefore involves the integration of the following methods: 1) elimination of breeding materials; 2) control of moisture; 3) mechanical control; and 4) judicious use of insecticides.

Good sanitation is the foundation of any successful fly control program. In most cases, removing breeding material is the most feasible means of breaking the fly life cycle. Corrals, run-in sheds and barns should be designed to facilitate the rapid and efficient removal of manure and other fly-breeding materials. Feeders should be constructed to minimize waste and prevent manure and feed from accumulating beneath them. Fly breeding materials should be removed and disposed of at least weekly. Large round hay bales should be stored on a well-drained site. Sanitation should be completed if fly breeding is to be minimized. Areas commonly missed in clean-up include around fence posts, outside and under fences, feeders or hay racks, corners in barns and stalls, around silos or other feed storage areas, and areas around water sources.

Manure and other fly breeding materials are most easily disposed of by spreading them thinly on pasture or cropland. Manure can also be stock-piled in one place and composted to reduce fly breeding problems. However, to prevent flies from developing in the outer layers, cover the waste with plastic.

Fly development can be inhibited if manure and other fly breeding materials are kept dry. Corral areas should be designed to promote adequate drainage and eliminate wet spots where fly breeding is more likely to occur. Similarly, good drainage away from manure stockpiles will also promote drying and help reduce fly breeding. Automatic waterers should be maintained properly to prevent leaks.

In addition to sanitation, more traditional methods of fly control should not be ignored when instituting a fly control program. Screening is an excellent way to keep flies out of areas, such as feed rooms, tack rooms and box stalls. Fans directing a blast downward and outward above doors will help prevent flies from entering barns. If only a few flies are present, sticky fly tapes can be used as a remedial measure.

Other means of **non-chemical control** are less effective. For example, electric fly zappers are of limited value and are usually not effective in areas where flies are actively breeding. The same is true for the numerous fly jugs and traps available. These devices may trap a few flies, but are of little value in reducing total fly populations where active breeding is taking place.

Biological control is another non-chemical method promoted for house fly and stable fly control. Several species of parasitic wasps may be purchased from a few commercial companies. With this method, the female wasps oviposit their eggs in the fly puparia and the wasp larvae then kill and consume the developing fly. Suppliers claim the wasps will provide long-term fly control. However, these claims have not been backed by sound research and have yet to prove an effective control benefit.

Despite proper sanitation and moisture control efforts, fly populations occasionally become large enough to constitute a serious problem. Insecticides are usually needed to round out a complete fly control program. However, they should never be the sole means of fly control. Rather, insecticides should be integrated into a total fly control effort. Several methods are available for using insecticides.

Residual insecticides are applied to fly resting sites, such as walls, ceilings and rafters of horse barns, run-in sheds or other farm buildings, as well as vegetation and fences. Effective insecticides often provide up to 6 weeks of control. In general, wettable powder formulations provide longer control than do emulsifiable concentrates, especially when applied to bare wood or concrete walls. Such organophosphate insecticides as stirofos (Rabon), malathion and diazinon are available as residual sprays as well as the pyrethroid insecticide permethrin. The problem with continued residual insecticide use is the development of resistance in the fly population.

Space sprays, **fogs**, and **mists** can be valuable in suppressing large populations of adult flies, particularly in enclosed spaces such as barns. Insecticides most commonly used are those containing synergized pyrethrins which are designed for quick knockdown with no residual action. These must be reapplied frequently. There are several kinds of sprayers available that produce the small particle size desired for this type of application. Portable equipment, either electric or gasoline-powered, is preferred because of the flexibility in reaching all areas of the facility and in the ease and ability to change insecticides or formulations.

A number of **commercial fly baits** are also available. Granular baits are the most common. They are best used as a supplement to other control efforts. Granular baits can either be spread in areas where flies congregate, or placed in traps or containers. They are only effective against house flies and will not kill stable flies. Insecticidal baits must be kept away from horses, other livestock, pets and children.

Larvicides are insecticides designed to kill fly larvae. They are most often applied where maggots develop, such as in manure piles. In general, larvicides should be used only in areas of intense maggot activity. Oral larvicides are designed to be incorporated into horse feed. When consumed, they pass harmlessly through the horse's digestive system, but remain in the feces where they kill developing fly maggots. Stirofos (Rabon) is available as an oral larvicide for horses. If there is extensive fly breeding in non-manure sources, however, oral larvicides have only limited benefit.

By properly integrating the house and stable fly control methods, these pests can be satisfactorily suppressed and the onset of insecticide-resistant fly strains will be delayed. Most resistance problems start in locations with poor sanitation and management and where insecticides are the primary means of control. If resistance develops, it is advisable to reply more on sanitation and other non-chemical controls and to use short-lived chemicals where possible.

Other vectors can prove more difficult to control. **Face flies**, for example, feed around the animal's head where it is difficult to apply insecticides. Second, face flies only land on the host for a short time each day. However, spray or wipe-on insecticides applied to the horses' heads daily may afford satisfactory control. Additionally, some insecticide-impregnated strips and collars are labeled for face fly control on horses, and fly shakes attached to halters may provide protection for the eyes. Wounds can be protected with dressings or fly repellents. Dustbags, face rubbers and insecticide-impregnated ear tags applied to nearby cattle herds are also useful in reducing the overall face fly population.

Horn flies can be easily controlled by the same efforts for controlling face flies on cattle. The various sprays, pour-ons and wipes available for horses will provide control of horn flies.

Control of **horse** and **deer flies** is extremely difficult. Spraying synergized pyrethrins, certain organophosphates or pyrethroids directly on the animal may provide limited protection.

Control of **mosquitoes** is most effective accomplished as a community-wide effort. Elminiating suitable breeding sites is the most permanent solution, but requires a lot of time and money. Mosquitoes on horses can be controlled by the daily use of sprays or wipe-on insecticides and repellents.

Like mosquitoes, **black flies** are best controlled with insecticides on a community-wide basis. But to prevent black flies from feeding in horses' ears, the inner portion of the ear should be coated with petroleum jelly every other day or so. Petroleum jelly prevents female flies from feeding and promotes healing of damaged tissue.

When using any fly control products on horses, it is essential to apply them where targeted fly species are most likely to feed. Also, because of environmental influences (rain, heat, ultraviolet light), many products just do not last as long as expected. When fly problems abound, fly control should be an integral part of the handler's daily grooming and horse care activities.

Horse Bot Flies

Nearly all horses become infested with horse bots sometime during the year. The common **horse bot fly** *(Gastrophilus intestinalis)* and the **throat bot fly** *(G. nasalis)* occur throughout the United States. The **nose horse bot fly** *(G. haemorrhoidalis)* is more common in the northern and midwestern states.

Horse **bot fly** adults superficially resemble honey bees and have nonfunctional mouthparts. Adults mate shortly after emergence and the female begins oviposting eggs almost immediately, laying between 150 and 500 eggs in their 7 to 10-day life span. The female common bot fly deposits her yellow-white eggs on hairs of horses' forelegs, chests, necks, bellies and sometime on the hindlegs and flanks. The eggs incubate for 1 to 5 days and then are stimulated to hatch as horses lick them. The warmth and moisture from the horse's tongue causes the eggs to hatch immediately, and the larvae then bore into the front of the tongue. After about a month in the tongue tissue, they migrate to the stomach and attach to the stomach wall. Adults are most active from July until frost.

Female throat bot flies lay eggs on the hairs under horses' jaws and throats. In 4 to 6 days the eggs hatch and the larvae crawl along the skin to the horse's mouth where they penetrate the soft tissue. After approximately 20 days, they leave the mouth and attach to the pyloric region of the stomach or the upper portion of the duodenum, the upper portion of the duodenum, the upper portion of the small intestine. Most adult activity occurs during late spring and early summer.

The nose bot fly is a rapid flier with females attaching their blackish eggs to hairs on the upper and lower lips of horses. The eggs hatch in 2 to 3 days and larvae penetrate the lip membranes in front of the incisors where they remain for about 6 weeks. After migration down the esophagus, they attach to the pyloric region of the stomach or the duodenum. Adults are active during the summer months.

When bot fly larvae are fully grown, they detach and pass out of the digestive tract with the feces. Larvae burrow into the soil to pupate and in 1 to 2 months, adults flies emerge. The entire life cycle from egg to adult requires a year.

The damage caused by bot flies is several fold. Horses may react so violently to ovipositing females that they injure themselves or others. Under such conditions, they may be unable to graze and may lose weight from lack of nourishment. Newly hatched larvae produce a severe irritation as they burrow into the horse's tongue, gums, or lips. To relieve irritation, horses may rub or bite on objects and injure themselves. Additionally, direct damage is produced by larvae feeding on and migrating through oral tissues. Damage in the stomach includes obstruction of the flow of food from the stomach to the intestine, and the irritation of the stomach wall by larvae attaching to the lining. Horses can suffer from colic and perforations of the stomach and walls of the small intestine. Larval infestations can also produce a marked swelling in the gastric submucosa of the stomach. Rupture of the stomach, peritonitis, and perforated ulcers can be attributed to the mechanical trauma caused by common bot fly larvae. What is more, a large infestation can cause esophageal paralysis in horses.

Effective control of horse bots requires breaking the fly's life cycle. Externally, sponging areas where eggs are attached with warm water frequently causes the eggs to hatch. On cool days, the larvae quickly die of exposure. A warm-water insectide wash can be sprayed or sponged on areas infested with eggs. Hatched larvae will die from contact with the insecticide. Treatments should be applied weekly during peak oviposition periods. Available insecticides include malathion, coumaphos, and stirofos (Rabon). Another method of external control is the physical removal of eggs from the horse's haircoat by clipping.

Internal medication of horse for bot infestations is best handled by a veterinarian trained in equine practice. Various formulations available include pellets, liquids, pastes, gels, boluses and powders to mix in feed or apply orally. Available drugs include dichlorvos, ivermectin and trichlorfron.