



CHAPTER 6: HOUSING AND FENCING

Shelter for most 4-H horses should provide protection from hot sun, wind or stormy weather. The type of shelter depends on the facilities available to each member. This varies from a three-sided loafing shed in the pasture to a barn with box stalls and a tack room. The stable need not be fancy, but it should be well-constructed for safety and arranged well so it can be kept clean. Listed below are some standard dimensions.

Your stable or shelter may not fit the listed dimensions exactly. Be certain there is room and plenty of light and ventilation with no drafts. The horse should have access to clean water at all times, either automatic waterers or buckets. Hang water buckets high enough so your horse cannot get its hoof in the bucket.

Shelter Space	Requirements
Box Stall	10' x 10' to 12' x 12'
Tie Stall	5' x 12' including manger
Ceiling Height	8' minimum
Doors	4' wide x 8' high
Hay Manger	28" sides, 38" high top edge
Grain Box	24" to 30" long, 8" to 10" deep 38" to 42" from floor to top

Arrange the grain box so your horse cannot get its hoof in the box and so the box can be cleaned easily. Construct the hay manger with an open space at the bottom for chaff, dirt and trash to fall out or so that it can be cleaned easily. Don't feed hay or grain on the ground because the horse will pick up dirt and sand with the feed. This may cause colic.

If you board your horse, there are several options: stabled (box stall), corral and pasture board. When selecting a boarding stable, ask what they provide for stabled horses. If you pay full board, the boarding stable should provide feed, cleaning and turn-out. Partial board arrangements vary, so check out what is included with your boarding arrangements.

If your horse is kept in a corral or pasture with a loafing shed, it is important that the shed and corral have enough room for the number of horses running together. Horses are herd animals and they establish social orders. Dominant horses bite and kick those horses who are in a lower social order. Be certain the loafing shed has enough room so the horses avoid being trapped by the dominant horse; this will help prevent injuries.

Regardless of where you keep your horse, always be alert for loose boards, nails and any projections that could cause injuries. Keep all wire and hay-bale twine picked up so horses don't get caught in it, resulting in injury, or eat it which causes health problems.

Construct fences of poles, boards, plastic (PVC pipe) or wire. The important thing is that the fence be visible to the horse to keep it from running through the fence. Wire fence should be smooth — not barbed wire. Barbed wire will increase the severity of injuries to horses. Construct electric fences of smooth wire. Check electric fence with a fence tester to be sure it works.



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Most electric chargers have a light that shows when the fence is not working or if the circuit is incomplete. Remove overgrown weeds from fence lines. Check all fences regularly and keep wire fences tight.

Disposal or composting manure

Develop a plan for manure disposal or use. Consider converting manure and yard waste into a useful product for gardening and landscaping. Composted manure returns needed nutrients back into the soil. See Colorado State Cooperative Extension fact sheet *1.219*, *Horse Manure: A Renewable Resource*, for information on composting horse manure. Ask your County Extension Agent for the publication called [Good Neighbor Guide for Horse-keeping: Manure Management](#).



CHAPTER 7: YOUR HORSE'S HEALTH

Evaluate your horse's health often. You control many factors that affect your horse's health. It's important to sanitize stables and feeding equipment; provide clean, quality feed; protection from disease and properly fitting equipment. Be sure to eliminate hazards around stables and pasture, and watch your horse for injuries or signs of disease, and the way you use your horse.

Proper treatment of diseases, injuries and parasites depends on two very important factors: correct diagnosis and knowledge of the proper medication. Your veterinarian knows what health and first-aid measures you can safely handle, and he or she will teach you the proper procedures.

This includes:

- recognizing health problems,
- what to do in case of sickness or injury before help can arrive, and
- simple treatments and remedies that are safe to follow under certain conditions.

It helps to become familiar with common diseases, parasites, injuries and health problems horses may encounter.

General

Cleanliness is very important. Clean feeders and water containers often. Bedding should be dry and clean, and manure should be removed regularly. The stable area should be level and well drained.

Stabled horses should have proper ventilation. Fresh air is needed even in winter, but avoid cold drafts. Urea in horse urine forms ammonia which can cause respiratory problems. If you smell ammonia in your horse stable, it's not cleaned well enough or the stable needs more ventilation. Keep stable temperature and atmosphere as close as possible to outside climates. Horses do not need to be kept in a heated barn.

First aid

First aid is the immediate and temporary care given to a horse until a veterinarian arrives.

First aid includes preventing your horse from further injuring itself. Horses are creatures of fright and flight. Their instinct is to bolt and run when they experience a trauma and this can often cause more harm. First-aid includes keeping the horse calm. For example, if the horse is caught in barbed wire or a feeder, calm and soothe the horse until it can be freed. Take care that you do not become injured while helping the horse. If the horse begins to shake and quiver after an injury, cover it with a blanket, it may be going into shock.



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Bleeding

The average volume of blood in a 1,000-pound horse is 36 liters or 8 gallons, about 6 to 10 percent of its body weight. A horse can tolerate losing of up to 25 percent of its blood — about 9 to 11 liters or 2.25 to 2.75 gallons. Because the horse is such a large animal, it can lose what looks like a lot of blood from an injury or laceration. However, blood loss is serious and should be controlled even if it may not be life-threatening.

To control a horse's bleeding, use a pressure bandage over the injury until a veterinarian arrives. Elastic bandages make good pressure bandages. It is important to be careful when you apply the bandage so the horse does not injure you. Many times a serious laceration of the limbs includes severed nerves which are sensitive to touch. Apply the bandage tight enough to dramatically slow the bleeding. If the bandage is applied excessively tight, it could work as a tourniquet that cuts off the blood supply to the limb beyond the bandage. The injured limb needs blood circulation.

Before treating a laceration, remember home remedies can contaminate the wound and make it more difficult for the veterinarian to treat. Do not use lanolin or petroleum-based products in or around a wound because they are not water-soluble and are impossible to remove from the wound. Clean dirt and manure out of an injury with water and organic iodine solutions (not the strong tincture of iodine) or scrubs. This is the only first aid you should administer without a veterinarian. A veterinarian should examine lacerations and sutures as soon as possible. Do not exceed 24 hours before (stitches) suturing.

Vital signs

What is normal? Closely observe your horse's eating habits, gaits, activities and attitudes to determine what is normal. Changes in these habits indicate a problem. Measure temperature, pulse and respiration rate, to determine if you notice changes and think your horse is ill.

Temperature

Take the horse's temperature with a rectal thermometer. Lubricate the thermometer and shake the mercury below 95 degrees Fahrenheit before inserting into the rectum. The normal temperature of a horse can range from 99.5 degrees to 101.5 degrees, with an average of 100 degrees. A fever is classified as mild at 102 degrees and excessive at 106 degrees. Exercise, excitement and hot weather raise normal body temperature.

Respiration rate

To measure the breathing or respiration rate, watch the flank and rib movements with each breath. Count the number of these in-out movements in a minute or for 15 seconds and multiply by four. An adult horse at rest breathing rate should range from eight to 16 breaths per minute. The rate increases with exercise. Younger and smaller horses have a more rapid rate.



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Pulse

A horse's normal pulse rate averages 35 beats per minute. Lower rates are normal for larger, older horses at rest. Younger, smaller horses have a higher pulse rate. A yearling has a normal rate of 40 to 58 beats per minute.

A horse's pulse can be felt in several places: the inner surface of the lower jaw, the back edge of the jaw or cheek, under the tail, or inside the left elbow (see figure 18). Usually the pulse is taken from the artery on the inside lower jaw. It is in front of the large, round jaw muscles and found by moving your fingers up and down on the inside and underside of the jaw bone. The artery feels like a flat, soft cord. By pressing the artery against the jaw bone, you can feel the pulse. As blood flows through the artery, it pulses against your finger. If you have trouble finding the artery, ask your veterinarian to help.

Capillary Refill Time

Capillary Refill Time (CRT) measures the time it takes for capillaries to refill with blood. It is an easy test to perform. Press the mucous membrane inside the nostril or the gums to measure CRT. As you press on the membrane, you press blood out of the capillaries. When you remove your finger the membrane appears pale. You can see the blood return as the membrane regains its pink color. It should take 1 to 2 seconds for the membrane to return to

1. The inner surface of the groove under the lower jaw (external maxillary artery)
2. The back edge of the lower jaw (the cheek), 4 inches below the eye (facial artery)
3. Under the tail, close to the body (medial coccygeal artery)
4. Point where heartbeat can be monitored with stethoscope
5. Inside the left elbow, up and forward, against the chest wall (heart)
6. The inside of the foreleg (median artery)
7. Behind the carpus, or knee (digital artery)
8. Medial or lateral pastern (digital artery)

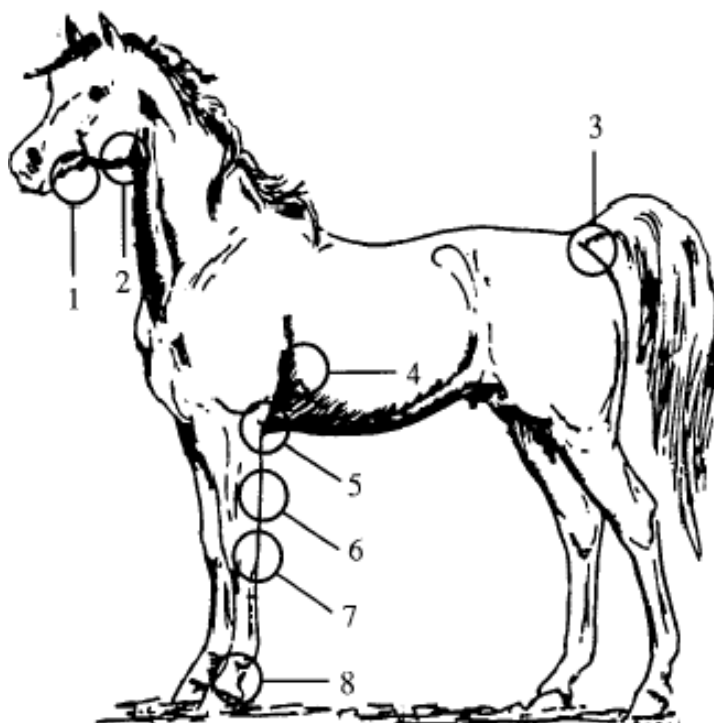


Figure 18. Points at which the horse's pulse can be felt and taken.



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the color of the surrounding area. If it takes longer than 1 to 2 seconds, your horse's circulation is poor, or it may be in shock. Use yourself as a comparison. Squeeze your thumb. Watch the color under your thumb nail. It will be pale pink when you release it, but the color will return rapidly.

Colic

Colic, acute stomach pain, is the number-one killer of horses and can be a serious problem. Call a veterinarian immediately when you suspect colic and begin emergency first aid.

Horses with colic have a faster heart rate and higher body temperature than normal. The horse will sweat, become restless, paw the ground, try to roll, get up and down several times, bite at its sides, kick at its belly, show a change in its manure, or fail to defecate. The pain may be caused by several intestinal problems such as an impacted or plugged intestine, sand in the cecum, increased activity of the intestine, inflammation of the intestinal membrane lining, blockage of blood supply to the intestine, or stretched digestive tract due to gas or undigested feed.

Colic is caused by a variety of circumstances including an abrupt change in feeding practices, overfeeding, parasites, poor feed quality, dehydration, eating sand, a twisted intestine or pregnancy.

To prevent further complications if your horse becomes colicky, keep the horse calm. Call a veterinarian immediately and keep the horse quiet to protect it from self-inflicted injury. The severity of pain is not a good indication of how serious the problem may be. Pulse rates over 50 to 60 beats per minute, slow capillary refill time and blue mucous membranes indicate the serious nature of the problem.

The risk of colic can be reduced by carefully using a good parasite control program and reducing stress on your horse. Be sure to provide plenty of fresh, clean water.

Other health problems

An elevated or below-normal temperature, rapid pulse, lack of appetite, very loose or watery stool, coughing, listlessness, dull eyes, and rapid, labored respiration with flared nostrils are indications of a problem.

Influenza (flu)

Influenza, a respiratory infection caused by a virus, commonly affects 2- and 3-year-olds. However, older horses can develop the disease if they are susceptible. The virus spreads rapidly between susceptible horses. The flu is common among horses that are concentrated together, such as at sales, shows and race tracks. Crowding and stress may make your horse more likely to get this disease. It may be prevented with semiannual vaccinations. However, horses at high risk should receive vaccinations every three to four months.



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Horses usually develop signs of influenza two to ten days after exposure. These signs include high fever, depression, shivering, inflamed throat, muscle stiffness and soreness, loss of appetite, increased pulse and respiratory rates, and fatigue. A dry, hacking cough later develops into a moist cough. Nasal secretions will be clear and mucous-like in the early stages. Complete rest is necessary for up to 30 days after these signs occur. Horses worked when they have temperatures often develop a bronchopneumonia complication. Horses that don't develop complications usually recover in one to two weeks.

Rhinopneumonitis

A herpes virus causes rhinopneumonitis. With flu-like symptoms, the disease has three distinct forms: respiratory, abortion-causing and neurologic.

- *Respiratory form.* This form occurs most frequently in young horses. Signs include a high fever (106 degrees), which may last one to seven days, and a clear to yellowish mucus-like discharge from the nostrils. It will remain fairly bright and alert with little depression. Coughing is uncommon unless the horse develops a secondary bacterial infection. Older horses infected with the virus have mild symptoms, but this form can be life threatening to younger horses.
- *Abortion-causing form.* This form occurs in pregnant mares three weeks to four months after infection or after the respiratory form infects horses on the premises. The virus causes the mare to deliver a dead foal during the last three months of pregnancy or to deliver a weakened foal that dies soon after birth.
- *Neurologic form.* The neurologic form usually occurs in horses more than one year of age. This form may follow respiratory or abortion-causing forms or may occur without prior signs of rhinopneumonitis. Uncoordination or paralysis of the hind legs is one sign of this form.

Vaccination prevents rhinopneumonitis, but does not produce lasting protection. Consult your veterinarian about a proper vaccination schedule.

Equine Infectious Anemia

A virus causes Equine Infectious Anemia (EIA), also known as Swamp Fever. Symptoms include a recurring fever, noticeable depression, increasing weakness, loss of muscle and weight, swelling in legs and underside caused by fluid accumulation, and anemia (lower than normal number of red blood cells). A test known as the Coggins test identifies this disease.

EIA has no specific treatments and cannot be prevented by vaccination. In many states, horse shows and races require a negative Coggins test for the disease on the horses before they may enter the state or the grounds. Most states require horses that test positive for this disease be kept in a permanent, lifetime quarantine or, because they are a lifetime carrier of the virus and are a threat to the total horse population, be put to sleep. Travel on interstate highways also requires a negative Coggins test.



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Strangles

Equine Distemper, Shipping Fever or Strangles, is a severe, contagious disease that primarily affects the upper respiratory tract. Several strains of streptococcus bacteria cause the disease. Symptoms develop two to six days after the horse has been exposed to the bacteria. Symptoms include a high temperature (103 to 104 degrees), nasal discharge, depression, an increased respiratory rate and a dry cough. Lymph nodes in the throat are swollen and painful.

Because of pain in the throat area, the horse has trouble swallowing and loses its appetite. Pain also causes the horse to stand with its neck stretched and head down. Swelling can be seen where the head and neck join. Swollen lymph nodes can become abscessed (filled with a creamy yellow, pus) and break open. Sometimes bacteria spreads to other lymph nodes in the chest and abdomen, causing serious complications for the horse. Nasal discharge is usually yellow or white.

Direct contact between an infected horse and a susceptible one transmits the disease. Bacteria also can be transmitted on buckets, feeders, fences, clothing, shoes and waterers. Rely on your veterinarian for vaccination recommendations and treatment.

Tetanus (lockjaw)

A neurotoxin produced by the bacteria *clostridium tetani* causes tetanus. It infects animals through deep puncture wounds from nails or splinters. Vaccinating your horse every year prevents tetanus. Booster vaccinations should be given when your horse is injured. The bacteria also can infect the navel of newborn foals. Tincture of Iodine or Betadine should be used on the foal's navel to prevent tetanus.

Symptoms usually occur within one to two weeks after injury. Tetany is the severe tightening of a muscle, muscle twitch or muscle cramp. Jaw muscles are some of the first to tighten and, since they are much stronger than muscles that open the mouth, the horse is unable to open its mouth. Lockjaw is the common name for tetanus.

Other signs include tetany of the muscles in the hind legs, or the horse holds its tail up, ears erect, head and nose high with its head extended; tightening of muscles in the body causing legs to assume a sawhorse stance is a symptom. The horse has trouble moving because all of its muscles are tight or crampy. They overreact to loud noises and fast movements. Inability to eat or drink, rapid breathing, rapid heart rate, constipation, elevated temperature, and excessive sweating also are common signs of tetanus.

Sleeping sickness

There are three types of sleeping sickness, or Equine Encephalomyelitis, named for the different viruses that cause them: Eastern Equine Encephalomyelitis, Western Equine Encephalomyelitis and Venezuelan Equine Encephalomyelitis. The three diseases transmitted by mosquitoes are difficult to tell apart since they produce similar symptoms.



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- *Eastern Equine Encephalomyelitis (EEE)* EEE is a severe disease of horses and humans and is often fatal. It doesn't occur as frequently as western equine encephalomyelitis, but it is more serious. Symptoms in the horse include fever, loss of appetite, depression, sleeping sickness, circling, head pressing, blindness, intense itching, paralysis of face muscles, difficulty chewing and swallowing, weakness, uncoordination, seizures, respiratory arrest, and death in up to 90 percent of the horses affected.
- *Western Equine Encephalomyelitis (WEE)* WEE received its name because it occurs primarily west of the Mississippi River and in western Canada. It is the mildest but most frequent of the three types of sleeping sickness. Symptoms develop several weeks after the horse is infected. They are similar to those of EEE and last for two weeks or more.
- *Venezuelan Equine Encephalomyelitis (VEE)* VEE is found in Central and South America. There was an outbreak of VEE in the United States in the 1970s. However, it has been eradicated here. It causes high death rates among humans, and horses serve as a reservoir for viruses that infect humans. Vaccinations for VEE are not used currently except for horses entering North Carolina and Texas.

Sleeping sickness can be prevented through vaccination. EEE, WEE and VEE vaccinations are combined with tetanus and influenza in one dose.

Potomac Horse Fever

Potomac Horse Fever is caused by an organism, *Ehrlichia risticii*, and is transmitted by insect bites. Symptoms include mild depression, refusal to eat, mild temperature, colic and profuse diarrhea 24 to 48 hours after onset that lasts for up to 10 days. Laminitis develops in one of four horses stricken with the disease. Treatment of severe symptoms usually is not successful, and the horse dies. Horses should be vaccinated in regions where the problem occurs most frequently.

Equine Protozoal Myeloencephalitis

EPM is a debilitating neurologic disease caused by a protozoal organism (*Sarcocystis falcatula*) which settles in horses' spinal cords. Affected horses generally lose coordination of their hind legs; the disease affects a horse's balance and mobility. Horses get EPM by eating sporocyst-infected feed. *Sarcocystis falcatula* is carried by birds which are eaten by opossums which shed the organism into horse feed, water and pasture. Horses cannot transmit the disease to another animal. A test for EPM has been developed.

Heaves

Heaves and broken wind are common terms that refer to *chronic pulmonary alveolar emphysema*. It affects the lungs and is most commonly caused by feeding dusty or moldy hay.

Symptoms of this disease relate to changes in the horse's lungs. Chronic coughing marks the beginning of the disease process. As changes in the lungs become more severe, the horse loses its stamina, nostrils flare and the horse suffers shortness of breath. In normal breathing when the



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diaphragm relaxes, the elasticity of the lungs forces air out. CPAE destroys this elasticity. The horse compensates by contracting its abdominal muscles to force abdominal organs toward the chest, pushing air out of the lungs. This looks as if the bottom of the abdomen is lifting up and occurs at the end of the normal shriveling of the chest during breathing. Because abdominal muscles become larger with this extra work, a line that defines them (heave line) develops along the bottom of the abdomen.

These changes in the lungs are permanent, and only the symptoms can be treated. Heaves can typically be prevented by feeding good quality, dust-free hay.

Laminitis (founder)

Laminitis means inflammation of laminae in the hoof of the horse. The white line in the hoof is the laminae, which are sensitive tissues inside the hoof wall that keep it attached to the third phalanx, a bone inside the hoof (coffin bone). Structures under the back of the third phalanx hold the hoof up. With this inflammation, attachments break down. After the break down, the front tip of the bone rotates or falls onto the sole and causes intense pain. The horse tries to reduce the pain by walking with its feet out in front and moving in a manner to keep pressure off its toes. Laminitis most often affects the front feet but may affect all four feet.

Laminitis can be caused by overeating grain, eating lush grass, drinking water before cooling down, infections, stress, and trotting or running on hard surfaces which cause a concussion. A horse that has laminitis has rough rings around the hoof wall. Horses with laminitis may be lame for the rest of their lives.

Hyperkalemic Periodic Paralysis

Some diseases are caused by genetics that can be passed on from parent to offspring.

Hyperkalemic Periodic Paralysis is an inherited disease of quarter horses and other stock horses. HyPP is characterized by seizure attacks of muscles, including muscle tremors, weakness or convulsions. Muscle fibers leak potassium into the horse's blood, making blood serum potassium levels increase. High serum potassium levels can cause cardiac arrest and death. Because the disease is genetic, there is no cure; however, diet or medication may prevent seizures. Genetic testing can be used to select breeding stock that are not carriers of the HyPP gene.

Teeth wear

Although tooth wear isn't a disease, tooth care helps keep your horse healthy. A horse eats fibrous materials that require a lot of chewing. This process causes the horse's grinding teeth (premolars and molars) to wear down. Because the upper teeth are set slightly wider than the lower teeth, sharp points develop on the outside of the upper teeth and on the inside of the lower teeth. These sharp points cause the horse to bite its cheeks and tongue as it chews food. It's harder for a horse with bad teeth to grind its food once it's taken in, which can lead to weight loss or a blockage in the intestines. Horses 5 years and older should have these sharp points ground off every year by a veterinarian using a dental float.



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Internal parasites

Internal parasite control is vital for your horse's health from birth to old age. A parasite is a living organism that spends all or part of its life in or on another organism and at that organism's expense. In general, the horse ingests parasite larvae while grazing or feeding from the ground. The larvae migrate through the horse's internal systems. Larvae eventually settle in or near the intestines, where they rob the horse of nutrients. When mature, they lay eggs which pass out of the horse's system in its manure. New larvae crawl up grass blades to be eaten by other horses.

A horse infected with internal parasites often shows a dull and rough coat, weakness, stunted growth, weight loss, colic, diarrhea (sometimes bloody) or tail rubbing. Horses can die from heavy infections and occasionally, healthy looking horses die from internal parasite damage. Regularly deworm your horse regardless of whether it looks like it has parasites or not.

Horses kept in confined areas with several other horses are constantly reinfested, especially if they feed off the ground. Owners must take extra precaution against parasites. Keep the area free from accumulated manure, do not feed on the ground and use deworming medications at frequent, regular intervals.

Ascarids (large roundworms), *bots* and *strongyles* (bloodworms) are the three most serious internal parasites. Deworming medications vary depending on the type of worm. Check with your veterinarian to plan an annual deworming program.

In general, parasites interfere with normal growth and development, cause poor performance in working horses, lower horses' resistance to disease and transmit diseases.

Roundworms or Nematodes

Roundworms are non-segmented, cylinder-shaped worms and are one of the most serious internal parasites.

- *Horse ascarid* (*Parascaris equorum*) is an internal parasite found primarily in young horses. In the life cycle of roundworms, females lay eggs in the horse's intestinal tract. Feces pass the eggs from the horse. Outside, larva develops within the egg. This is first stage larva.

In the environment, second-stage larvae are in the infective stage (ready to infect the horse) and form while still in the egg. After the horse eats these eggs, they hatch in the small intestine, burrow through intestinal walls, get into veins and drain blood. They then travel to the liver, where they burrow around the liver tissue and drain blood from the liver before moving on to the lungs. Here they burrow through lung tissue until they get into the air passages. They molt to a worm and migrate into air passages, causing a tickling sensation. The horse coughs them up and swallows them, and they go back to the small intestines where they molt to adults. Migration takes one to two weeks. These large worms can cause blockages in the intestinal tract, bleeding, and secondary pneumonia in the lungs.



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Botflies

Three species of botflies affect the horse. Adult botflies have no mouth parts and do not “feed” on a host. However, the activity of adult female botflies laying eggs on a horse is bothersome to the animal. It is the size of a honeybee with a curved tail. The common botfly (*Gastrophilus intestinalis*) deposits its eggs on the horse’s shoulder, mane, front legs and sides. The throat botfly (*Gastrophilus nasalis*) lays eggs on hairs of the chin and bottom of the throat. The nose botfly (*Gastrophilus hemmorhoidalis*) lays eggs around the lips and nose. Eggs are yellowish, the size of a pinhead and cling to hair.

The horse’s warm tongue licking the eggs makes the common botfly hatch. Larvae hide under the mucous membrane in the mouth for one month, then come to the surface and are swallowed.

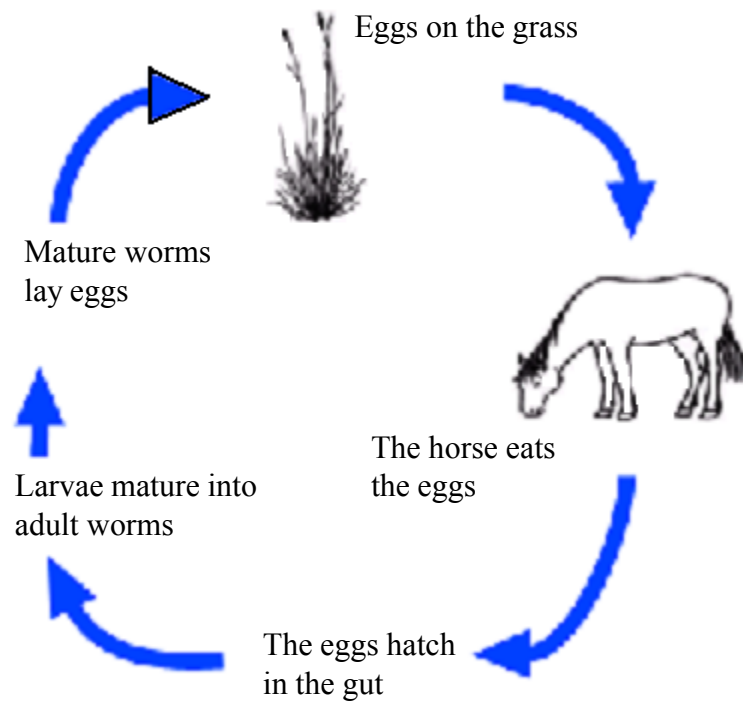
The other two types of botfly eggs hatch without stimulus. They burrow through the skin and under the mucous membrane, then begin a life cycle similar to the common botfly. When the larvae enter the stomach, they attach themselves to the stomach lining and cause sores that can penetrate through the stomach wall. This can cause a severe abdominal infection which could kill the horse. In 8 to 11 months, the larvae pass from the horse, burrow 1 inch into the soil, pupate and return to the surface as adult flies between June and August.

Remove botfly eggs by carefully scraping horse hairs with a dull knife or piece of screen. This should be done frequently to prevent eggs from hatching and larvae from infecting the horse.

Strongyles

Three species of strongyles, commonly called blood worms, are a major threat to the horse. They are the single-toothed strongyle (*Strongylus vulgaris*), toothless strongyle (*Strongylus edentatus*) and large strongyle (*Strongylus equinus*). All have the same life cycle until they are ingested and go into the large intestine or cecum. From there, life cycles differ.

Once strongylus egg hatch, larva is released. It feeds on organic debris and bacteria. It sheds its cuticle covering, grows slightly and molts. At this stage, the larva is infective; it develops into an adult worm



Strongyle Life Cycle

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when it returns to the digestive tract of the horse. Once in the digestive tract, the larva molts into an adult parasitic worm. Under good environmental conditions, the first stages take three days to a week. After the larva finds a host, it takes 21 to 30 days to become an adult worm.

- *Single-Toothed Strongyle*. The most serious of the three, it burrows through the intestine wall and gets into the arteries. It prefers the artery that supplies blood to the intestinal tract (anterior mesenteric artery). When they burrow into the arterial wall, the wall weakens so that the artery balloons — called an aneurysm. This weakened area can rupture and cause the horse to bleed to death. The larvae also cause body tissues to become inflamed, which can plug the artery — called a thrombus — or some of the material can break off and flow with the blood through the artery until it reaches a smaller artery that it plugs — called an embolus. The flow of blood stops — called an infarct — when arteries plug. The tissue not receiving blood dies, in this case part of the intestines. This causes severe colic. In most cases, the horse will die without surgery. Eventually larvae go back to the intestines and form adult worms. This process can take six months or longer. There are no effective medications to treat single-tooth migrating larvae.
- *Toothless Strongyle*. It leaves the intestines, goes to the liver, then to the tissue around the kidneys and back to the large intestine. This journey causes damage to the liver and signs of colic. Because the larvae can carry bacteria, they can cause serious infections in any of the tissues they travel through. They also can rupture blood vessels, especially around the kidneys, causing hemorrhaging so severe that the horse could die. Their trip can take as long as 300 days.

- *Large Strongyle*. It leaves the large intestine and goes to the liver and pancreas. Its burrowing damages these organs, and they can cause infections before returning to the large intestine. It takes about 240 days for the journey.

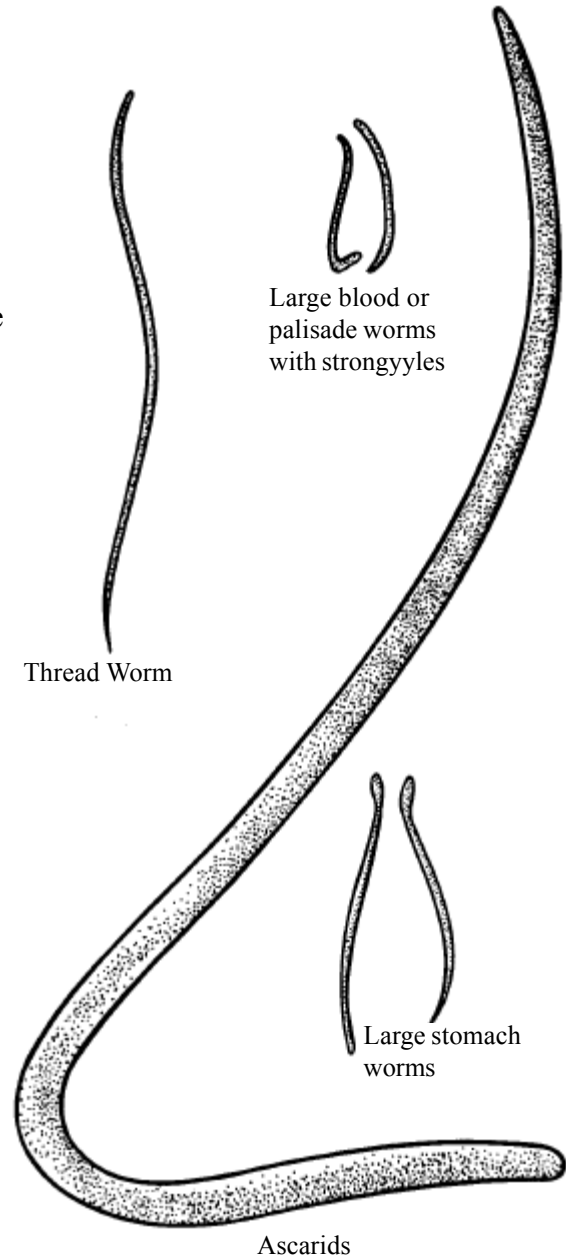


Figure 19. Strongyles (actual size).



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At least 12 species of small strongyles do not cause disease but lay eggs that look like those previously discussed. This complicates diagnosis of the serious strongyles when feces are examined for eggs.

Some roundworm eggs are very resistant to the environment and can survive as long as five years. Advanced stages of larvae have two cuticles, or coverings, and can survive up to a year in the environment. Environmental factors that favor egg and larva survival are moderate temperatures, adequate moisture and shade. The most potent weapons to control internal parasites in horses are extreme temperatures, drying and sunlight. Favorable environmental factors for parasite survival also stimulate the infective-stage larva to move up blades of grass to gain access to a horse. Conditions are more favorable at dawn and dusk. Running horses on pasture during hot, sunlit days and removing them at dusk through dawn will decrease their exposure to larvae. Since it takes three days to a week for the infective-stage larva to form, removal of fresh horse manure from the stall or paddock every two days will decrease exposure to parasites.

Pinworm

Pinworm females crawl out of the anus and lay eggs that stick to the skin around the anal opening. These drop off in about three days. The larva develop inside the egg shell and are eaten by the horse. Then, the larva molts to the adult stages and passes through the large intestine and completes its life cycle.

The activity of the female as it crawls in and out of the anal opening and the cementing substance that holds the eggs to the skin cause intense itching. The horse scratches itself by backing up to and rubbing its tail against a solid object like a fence post or barn. This causes an unkempt, ragged appearance to the tail. The horse may lose weight and muscle because it spends more time scratching than eating.



Habronema

Habronema are stomach worms. Several species affect horses: however, horses rarely have heavy infestations. Fly larvae eat these eggs and, as the fly develops the larvae develops. The horse eats infected dead flies in feed and water. One habronema species causes benign tumors in the stomach wall. Occasionally, infected flies release habronema larvae into skin wounds. These larvae do not become adults because they must be eaten. They cause intense itching and open, oozing sores called Jack-sores or summer sores.

Others

Lungworms, tapeworms, liver flukes and *roundworms* also infect horses, but are rare. Many compounds are available to treat internal parasites. Some are powders fed with grain, others are pastes or gels squirted in the horse's mouth, and some can be given through a stomach tube. These compounds have varying degrees of effectiveness against each of the internal parasites. A veterinarian should be consulted to develop a control program that will fit your management.



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In general, horses should be dewormed every two months, but develop a parasite control program with the help of your veterinarian. Horses should be dewormed before being released into a new pasture or a cleaned corral to prevent contamination of the new area with parasite eggs. Treatment for botfly larvae in the stomach should be delayed until at least one month after the first fly-killing frost.

Removing manure from corrals can remove eggs and larvae and allow the ground to dry. Mowing tall pastures increases the amount of sunlight on the ground and allows it to dry. Sanitation plays an important role in preventing parasites.

External parasites

Flies

A number of flies cause problems in horses. Not only do they irritate the horse, they also transmit diseases.

- *Stable flies* suck blood from horses and other animals. The female lays its eggs in manure, urine and straw. This fly can carry the internal parasite larvae of *Habronema*, which cause summer sores. Cleaning destroys fly breeding sites.
- *House flies* do not suck blood but can transmit many serious diseases including the *Habronema* larvae. This fly lays its eggs in manure and straw.
- *Face flies* irritate the eyes. The fly is quite similar to the house fly.
- The *horse fly* is a large, black fly. Its bite is painful and may leave a bleeding wound. The *deer fly* is smaller and lighter in color with dark bands across its wings. Both flies can transmit diseases to horses. Larvae form from eggs deposited in muddy, wet areas. They burrow into the mud, emerging as adult flies 10 to 11 months later.
- Decaying and dead tissue attracts *blow flies*. They deposit eggs in infected wounds. Their eggs develop into fly larvae called maggots. Keeping wounds clean and uninfected along with using fly repellents around injuries will prevent blowfly maggots.
- *Wohlfarthia flies* larvae which penetrate skin, forming abscess-like bumps containing the larvae. Maggots must be removed before the condition improves.

Mites

Three types of mites (mange or scabies) parasitize horses. They produce a condition similar to lice that cause large areas of skin to become bald, reddened and inflamed. Intense itching causes the horse to rub or scratch the infected areas and makes the injury to the skin worse. Mites are small (1/40 inch) and can't be seen without a microscope. Because they burrow into the skin, some skin layers must be scraped off and examined with a magnifying lens or a microscope to see mites.



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Horse lice

Horse lice are uncommon but can become a problem. Two primary kinds of lice parasitize the horse; a chafing or biting louse and a sucking louse. Both cause intense itching so that the horse rubs against solid objects and bites or gnaws at affected areas. As a result, large areas on the neck, shoulders, flanks and hips lose hair and become red and inflamed. These symptoms are worse in the winter and early spring when lice populations peak. Adult lice are about one-tenth of an inch long, chestnut brown in color and clearly visible. Their eggs (nits) appear as whitish, small structures attached to fine hairs on the horse's body.

Funguses

Funguses also parasitize the skin and produce a condition commonly called ringworm. It is not caused by a worm, but some of the sores caused by the funguses appear ring-shaped with reddened patches covered with scabs. A better name for fungal infections of the skin is dermatomycosis. These sores can be small to fairly large. They are hairless and inflamed with crusts. The funguses can be highly contagious, not only to other horses but also to humans. Care should be taken when handling horses with this problem. The funguses can be transmitted on infected tack and brushes to uninfected areas and to different horses.

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Table 9. Equine Immunization Program

<i>Disease</i>	<i>Product</i>	<i>Procedure</i>	<i>Booster</i>	<i>Comments</i>
Tetanus (Lockjaw)	Antitoxin (passive or temporary immunity)	15,000 units or more as indicated when prior vaccination status is unknown	Usually not done	Can be given in conjunction with tetanus toxoid.
	Toxoid	Primary immunization: 2 doses, 4 weeks apart	Single dose annually	Often in combination with either encephalomyelitis or influenza vaccine products.
Equine Encephalomyelitis (Sleeping Sickness) Eastern Western Venezuelan	Numerous products available. All are killed virus. Most often all species are combined.	Primary immunization: 2 doses, intramuscular, 2-4 weeks apart	Single dose annually	Best if vaccinated in spring before insect season.
		Primary immunization: 2 doses, intramuscular, 2-4 weeks apart	Every 2-12 months as indicated by situation	Vary booster frequency depending on horse's potential exposure. Very common disease.
Influenza (Flu) 2 virus strains	Numerous products available. All are killed virus, all have both viral strains present.	Primary immunization: 2 doses, intramuscular, 2-4 weeks apart	Every 2-12 months as indicated by situation	Virus causes upper respiratory diseases, central nervous system disease, or abortions in mid to late pregnancy.
Rhinopneumonitis (Equine Herpes virus, viral abortion)	Modified live virus, killed virus.	Primary immunization can be multiple doses at varying intervals depending on exact product used	Every 3-12 months as indicated	Controversy as to effectiveness of various products. Generally used only in specific circumstances.
Streptococcus equi (Strangles)	Products available are either killed bacterin or specific protein from cell wall.	Primary immunization: 2 doses, intramuscular, 2-4 weeks apart	Annually	Indications for use are now common, especially in endemic regions.