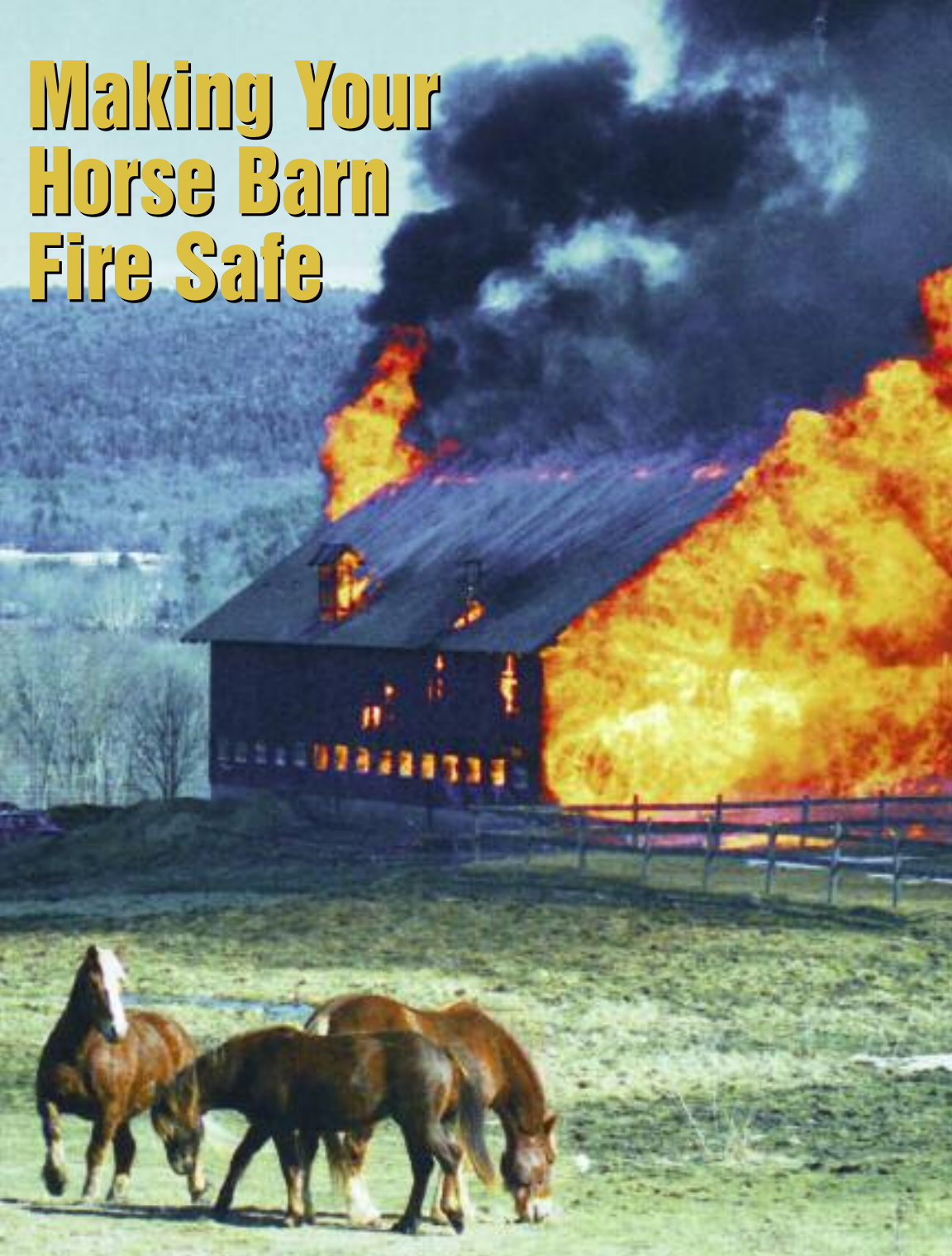


Making Your Horse Barn Fire Safe



THE HUMANE SOCIETY
OF THE UNITED STATES



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Acknowledgements

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Introduction

BARN FIRES are one of any horse owner's biggest nightmares. In just a few minutes of heat, smoke, and fury, thousands of dollars of saddles, bridles, hay, grain, and equipment can be lost along with the barn. That your horse could be trapped inside is almost too painful to imagine.

The National Fire Protection Association (NFPA) estimates that from 1999 to 2000 there were an average of 5,800 structural fires in barns and other livestock facilities, causing an estimated \$124.6 million in direct property damage. In addition to the loss of farm buildings, agricultural equipment, and livestock, one person died and 34 others were injured in these fires.

Fifty years ago, farmland was plentiful and barns were widely spaced. Now, as horses increasingly become part of the American suburban scene, barns are constructed on properties with very little acreage and with neighboring barns and outbuildings in close proximity. A barn or pasture fire may put any number of nearby structures at risk.

Most barn fires are preventable, and too often they result from negligence or apathy toward fire prevention. Many of us think that posting a "No Smoking" sign is all that's necessary to protect our horses and barns, and unfortunately this is often the only technique mentioned in horse husbandry texts. But you can—and should—do much more than this to keep your barn and your horses safe from fire.





PART 1:

Fire Safety Precautions for Existing Barns

JUST AS WE NEED OXYGEN TO SURVIVE, so does fire. Horse barns are usually designed to provide good ventilation, which also permits a continuous supply of oxygen for a fire. Fire needs fuel to burn, and fuel sources like wood, grain, hay, and bedding are abundant in barns. Alcohol, liniments, hoof paints, and creosote are liquid fuels. Along with oxygen and fuel, there must be a source of heat that raises the fuel to its ignition point. Heat can be provided by sunlight, friction, electrical energy, open flame, gas compression, and bacterial or chemical reactions.

Fire suppression succeeds when any of the essential components a fire needs to continue are reduced or removed. Water is the most commonly used suppression material because it lowers temperatures so quickly.

Fire prevention for the most part consists of the day-to-day things you do to maintain a fire-safe building. Remember the fire propagation requirements—heat, fuel, and oxygen—to keep an eye out for possible hazards. Evaluate your barn and notice where the sources of heat, fuel, and oxygen are located.

No Smoking

Obviously, the most common source of heat is an open flame—a match. Stringently enforce the “No Smoking” rule, not just by posting signs but also by firmly telling smokers to refrain. There seems to be an unwritten code that a horse person can smoke in his or her own barn but not in someone else’s. For safety’s sake, there should be *no* smoking permitted in any barn, at any time.

Some offenders will not give up easily. Anyone who willfully violates the “No Smoking” rule is not someone you want around your barn. Be firm: Either the smoking materials go or the violator goes. And if you issue the ultimatum, follow through! There are no safe smoking areas in barns, and every real horse person knows that.

Smoking is not the only potential source of open flames. Consider the following true story about a barn equipped with water pipes running to each stall. In winter, some of the water spigots at the stalls would freeze, so the owner began thawing the troublesome spigots with a disposable lighter. Since it took less than a minute to thaw each spigot, the owner didn’t consider the lighter a hazard. One morning a curious horse put his nose up to the lighter. He jerked away quickly, but the hay hanging from his mouth ignited. He dropped the mouthful, which fell on the hay at his feet—and *that* hay began to burn. Fortunately, a filled water bucket was close at hand and the owner quickly extinguished the fire. The heart-stopping experience was a forceful lesson for the owner, who hasn’t used a lighter in the barn since.

Restrict Access

In 1987, a fire at the Exhibition Park Raceway in New Brunswick, Canada, claimed the lives of 30 racehorses. Reporters noted that teenagers who were sitting in the barn started the fire and fled the scene without reporting it. The barn was completely engulfed in flames by the time firefighters arrived.

What were the teenagers doing in the barn? Did they have permission to be there? Be aware of who is in your barn. Monitoring the access and activities of people entering your property is another important step in fire prevention.

Keep It Clean

A broom and rake are the two best fire prevention tools a horse owner can have. Maintaining a clean barn is excellent fire protection and requires minimal daily effort.

Use a broom to get rid of cobwebs hanging from the rafters. Cobwebs provide excellent pathways along which flame can travel so quickly that in seconds fire will have spread from one end of the barn to the other, and burning pieces of cobwebs falling into stalls will start new fires. Sure, after a few days they'll all magically reappear, but keep after them.

Keep loose hay and straw raked up. If you have hay drops into stalls from an overhead loft, don't permit loose hay to hang over the edges. Like cobwebs, flaming hay can fall and start new fires. The best way to prevent this is to cover the opening of each hay drop. A plywood cover will do nicely. A better option would be plywood covered on each side with flame-retardant, one-hour-rated gypsum board. (One-hour-rated gypsum board is treated with a fire retardant. The hour rating indicates how long the material will withstand the passage of flames and prevent the fire from spreading farther. See page 30 for a list of flame-retardant-treated wood suppliers.)

There should be no compressed gases in your barn except consumer products in aerosol cans, such as grooming sprays or insect repellents. The only permanent source of compressed gas permissible should be compressed air, carbon dioxide, or nitrogen used in a dry sprinkler system (see page 26). Never store other compressed gases, like welding gases or propane for a grill, in the barn.



This barn presents a clear fire hazard. Maintaining a clean barn free of hanging cobwebs, loose hay and straw, compressed gases, clothing, and cleaning supplies is excellent fire prevention and requires minimal daily effort.



Bacterial and chemical reactions within damp, improperly cured bales of hay can cause spontaneous combustion—a source of many barn fires.

Keep It Cool

Bacterial and chemical reactions are the source of heat for many fires. A common example is the bacterial reaction that occurs in damp, incompletely cured (dried) hay. Heat is generated during the curing process, which begins while the hay is on the ground, prior to baling.

In a stack of damp hay, two fire propagation requirements—fuel and heat—are at work. The only thing lacking in sufficient quantity is oxygen. The moist interior of the hay may smolder unnoticed for some time before the edge of the stack is reached. When the heat reaches the edge of the haystack, oxygen is suddenly available in abundance and a full-blown fire begins. The same process may happen with damp grain, sawdust, or wood shavings. Mild eye irritation when you're in the immediate vicinity of a haystack or a "sooty" odor may indicate spontaneous heating.

The curing process can continue for six weeks after baling, so it may be necessary to check newly baled hay on a regular basis until curing is complete.

Monitor your haystacks and bales to determine if spontaneous heating is occurring by inserting a thermometer into the middle of the stack or bale. If the thermometer reads 150 degrees Fahrenheit, recheck the stack or bale in four hours and at four-hour intervals thereafter. If the temperature rises to 175 degrees Fahrenheit or higher, call the fire department to have firefighters stand by with charged hose lines while the suspect bales are moved from the barn or storage area. You need firefighters on the scene because the bales may ignite while they're being moved due to the increased availability of oxygen.

Spontaneous Combustion Warning!

If you have the *slightest* suspicion that spontaneous heating is occurring, call your fire department without delay.

Don't Let the Electrical System Slide

In 1991, firefighters in Clarence, New York, responded to a barn fire caused by a faulty electric hot water heater. The alarm sounded at 1:30 a.m. Flames were showing throughout the entire length of a 200 x 160-foot horse stable and riding arena when firefighters arrived. Approximately 40 horses perished, and the building was a total loss. Only three horses were saved.

Perhaps a routine inspection of that water heater would have found a potential problem and averted the fire. Don't take chances. Inspections are a smart precaution.

Electrical malfunctions are a major cause of fires. All electrical wiring should be enclosed in metal or PVC conduit (pipe). Conduit is used to protect wiring from corrosion from the weather or destruction by animals and birds. Animals can chew on exposed electrical wiring and cause damage that quickly becomes a fire hazard. If there is any exposed structural wiring in your barn, call in a qualified electrician to correct the situation.

Identify the location of your electrical panel with an easy-to-see red or yellow flag or sign. Hire an electrician to install a switch that will cut off all electrical power to the barn without turning off power to other buildings, telephones, and water pumps. This switch must be on the outside of the barn and clearly marked so that it's visible from 75 feet away.

Perhaps the major source of daily concern for most horse barn owners is electrical appliances. Portable heating units (of any type—electric or gas) and infrared heat lamps are a major cause of barn fires today. Heating appliances have little place in a barn, except for specific medical uses like supplying extra heat for newborns—and even this use must be monitored carefully and constantly.

No heating appliance should ever be left unattended. Ideally, appliances should only be used in stalls in which at least three sides are constructed of concrete block, brick, or other fireproof material. The fire resistant material should extend from floor to ceiling or roof. Radios, clippers, extension cords, and similar portable electrical appliances should be disconnected when not in use.

It's especially important never to leave electrical water-heating coils unattended because the coils will continue to heat buckets after the water has boiled out, allowing heat to transfer to adjacent materials. After use, water-heating coils should be hung from hooks in an open area until completely cooled.

Because day length can affect shedding and the development of a horse's winter coat, some people have tried using sunlamps and extra light sources to keep hair coats in prime condition. It's a dangerous shortcut. In addition to the high heat generated, unguarded units may be viewed as "playthings" and some horses will rear up and bite at the lights. In several instances, horses have broken the bulbs and electrocuted themselves.

Any electrical appliances installed in the barn—including water heaters, pipe-heating tape, and insect-control devices—should be routinely inspected by a qualified electrician. All electrical devices need to be cleaned every three months. A can of compressed air is all that's needed. Unplug the device and use the air spray to blow dust and dirt away. Clean the dust from electrical outlets, too.

Lightning Protection

Lightning can enter a building by striking a metal object, such as a television antenna, cupola, or anything that extends upward from the building. It may strike and follow a power line to the building. If a tree close to the building is struck, the lightning may arc from the tree to the building.

A Lightning Protection Institute study of 250 equine lightning deaths showed that 41 percent of the horses weren't struck directly; they burned to death or asphyxiated in barns that caught fire when struck by lightning. Another Lightning Protection Institute study found that nine out of ten barns struck by lightning burn to the ground—they are totally destroyed.

Lightning rods are the best protection against naturally occurring electricity. Lightning rods give lightning a direct path to follow to the ground.

Beware of fly-by-night lightning protection businesses. Be certain to carefully check the credentials of any firm you hire. You can verify the installer's certification by calling the Lightning Protection

Institute at 1-800-488-6864 or visiting www.lightning.org, but if you have any doubts, find another installer. Legitimate lightning protection installers will gladly show you their certification and provide other important information up front.

Make sure all parts of the lightning protection system have been tested and approved by Underwriters Laboratories Inc (UL).

Fire Prevention outside Your Barn

Look beyond your barn for more ways to protect it from fire. Brush, debris, and machinery outside the barn can all be sources of fuel for a fire.

Remove weeds growing close to the barn. Properly trimming, pruning, and cleaning under trees and bushes on the property will also make a difference. Fire department personnel caution that live trees, while not generally combustible, can catch fire simply because debris was allowed to accumulate beneath them.

If your pasture fronts a road, keep the grass along the road right-of-way closely mowed. A driver's carelessly tossed, still-burning cigarette—or the match used to light it—could be a fire starter. If possible, leave a barren strip 15–20 feet wide along the road to act as a firebreak. (Sometimes soil erosion problems, plus the need to maximize the use of every precious foot of pasture, preclude leaving a bare area.)

Farm tractors and other gasoline- and diesel-powered vehicles should be parked away from the barn. If they must be kept nearby, they should be parked at least 50 feet away from any structures housing animals. And maintain vehicles and equipment properly to avoid problems with the fuel or exhaust systems, which may make them more prone to catching fire.

Refueling should be done as far away from the barn as possible. Gasoline vapors are heavier than air. As gasoline is poured from one container to another—for example, from a gas can to a tractor fuel tank—the escaping vapors settle in depressions in the ground, beneath any openings in the foundation of nearby buildings, in floor drains, or in other low spots. Gasoline vapors will readily ignite, so a lit match in the vicinity—or even at some distance if topography

and ventilation are right—might start a fire.

Many fires are caused by grass, leaves, or weeds caught on tractor and truck exhaust manifolds and exhaust systems. These fires may start after the equipment is parked or put away and the operators are out of sight of the vehicles.

Parking other farm equipment and trailers some distance from the

Tractors, lawn mowers, trucks, chain saws, and other diesel- or gasoline-powered equipment should not be parked or stored in any building housing horses. Items such as these have caught fire and destroyed barns!

barn is also a good way to keep debris from collecting around equipment. It's amazing how many items can be "stored" under or behind seldom-used farm equipment—items that might provide excellent fuel for a fire. And keeping equipment away from the barn allows firefighters space to work in case of a fire.

If your barn isn't easily seen or accessible from the road, inform your local fire department personnel about the situation and ask them to make a plan (called a *pre-fire plan* or *pre-plan*) for your property. The request has to come from you directly. While annual fire safety inspections may be required for commercial establishments, fire department personnel cannot inspect your home or barns unless you invite them onto your property and request a fire inspection.



The electrical, fuel, and exhaust systems of tractors and other vehicles parked near barns can cause fires—and the vehicles and clutter around them can impede firefighters' access.

IF A TRACTOR pulling a manure spreader or wagon is driven into the barn during stall cleaning, it must never be parked blocking an occupied stall or left running unless it's being driven. All internal-combustion engines, whether gasoline- or diesel-fueled, produce carbon monoxide. Carbon monoxide (CO) is also a product of every fire. CO is an odorless, invisible gas, and it is deadly. It displaces oxygen from red blood cells, resulting in unconsciousness and death from a lack of oxygen to the brain. Death may occur without warning following relatively brief exposure to CO, although a headache or dizziness sometimes precedes unconsciousness. Emergency treatment involves immediately removing the victim from the CO source to fresh air and administering supplemental oxygen.

When vehicles are operating, carbon monoxide is given off in the exhaust. Even if your barn is well ventilated, carbon monoxide can accumulate in stalls and alcoves, causing a life-threatening medical or veterinary emergency. Keep the use of vehicles in your barn to a minimum. In large barns where it would be slow and inefficient to clean with wheelbarrows and muscle power alone, always keep the dangers of carbon monoxide in mind to lessen your chances of becoming a victim. ■

Carbon Monoxide Warning!

When using internal combustion machines of any kind in your barn, be sure the area is well ventilated and use the equipment for as short a period of time as possible.





Part 2: Responding to a Fire

Heat and Smoke Detectors

WHEN A FIRE STARTS, every second is critical. You need to be alerted as soon as possible!

Smoke detectors installed in homes have been credited with saving many lives by warning residents of danger and allowing them time to escape. Unfortunately, most residential and commercial smoke detectors do not work well in barns because the ever-present dust quickly clogs the mechanisms and renders them inoperable. However, optical smoke detectors designed to operate in dusty areas are available. These detectors must be professionally installed because the proper location of detectors within a building will vary according to each building's design. Some companies specialize in installing optical smoke detection systems for barns and stables. Contact a fire safety product specialist in your area for more information.

Heat detectors can be used in conjunction with smoke detectors, but a certified installer must determine their placement within the barn. And heat detectors are effective only in closed spaces such as tack rooms, feed rooms, and utility rooms. By the time a heat detector is triggered in an open area like a stall, the fire would be out of control. Two types of heat detectors are available: rate-of-rise and fixed temperature detectors. The rate-of-rise detector is activated when the air surrounding the detector rises several degrees in a very short time, usually 10 degrees Fahrenheit within 60 seconds. Fixed temperature heat detectors are designed to activate

at a preset temperature, which can range from 135 to 190 degrees Fahrenheit. The location of the heat detector in the barn determines the appropriate setting. The cost of a professionally installed heat or smoke detection system may run several thousand dollars, but it's a worthwhile investment.

Smoke and heat detection systems sound an alarm when triggered. So for the systems to be effective, someone must be around to hear the alarm and respond to it. The siren or bell should be loud enough to be heard from some distance.

An intercom system from the barn to the house can help you hear the alarm when you're home. The intercom system doesn't have to be elaborate or expensive. It can be a valuable instrument for "seeing" your barn when you're in your house. After you've had a few days to adjust to the intercom, you'll no longer notice the bumping of salt blocks in feed tubs or other normal background sounds. What you will notice is anything out of the ordinary—a horse in difficulty, intruders, or frightened whinnies.

If someone will always be in the barn—a resident caretaker, for example—he or she must have access to a manually operated farm bell or siren outside the barn to signal for additional help. In some areas, such as multibarn facilities or racetracks, a strobe light activated by the alerting system is mounted on the roof to attract attention and indicate in which building the alarm was activated.

More commonly, though, stables must be left unattended for long stretches of time. If this is your situation, consider installing an alerting system that's tied to a monitoring station through phone lines. The fire department will be notified immediately, even if you are unavailable. Check your local phone directory under the "Fire Alarm Systems" heading to locate companies that install alerting devices.

A telephone is a necessity, not a luxury, in the barn. In case of injury or fire it's the swiftest way to summon professional help. Calling the fire department in the midst of an emergency, however, shouldn't require you to do anything more than read. Even if you're on your own property, the stress of the situation may make you forget your address.

To make this extremely important call and relay information

accurately, post a large sign just above or beside the phone. The sign should give clear instructions for what the caller is to do and say. For example:

Call fire department at (your fire department's number or 911 if that service is available in your area).

Say "I have a horse stable fire at (your address)."

If special directions are needed to reach you, these should also be written clearly on the instruction sheet. Emergency information signs with spaces to write in your information are available at tack shops and feed stores. Whether you purchase a sign or create your own, make certain that the critical information is readily available.

Note that the caller is instructed to say "stable fire" rather than "barn fire." By specifying that a horse stable is on fire, you're letting emergency personnel know that living creatures are involved, not just hay or other materials in a storage barn.

Call fire department at (your fire department's number or 911 if that service is available in your area).

Say "I have a horse stable fire at (your address)."

Evacuating Your Barn

Before beginning evacuation, call the fire department! Alerting the fire department should always be your *first* step in responding to fire. The second step is to warn and evacuate all nonessential personnel from the barn (for example, students or visitors). Only then should you begin to evacuate the animals.

Evacuating animals in a fire should not, if at all possible, be the job of the fire department. Even a skilled horse person can find it difficult to handle an excited 800- to 1,600-pound animal. A firefighter unaccustomed to handling horses is as useless in that situation as you would be handling hose lines and nozzles. Firefighters may also be hampered in their movement by their protective gear, and the sight of such protective equipment is liable to further scare an already frightened animal. It's perfectly correct, however, for firefighters to direct the orderly evacuation of animals if it hasn't been done before they arrive.

At the scene of a fire, the fire department is in charge, superseding even the authority of law enforcement agencies. Your state fire code will contain language similar to this: "The fire chief or an authorized representative shall be in charge at the scene of a fire or other

emergency involving the protection of life and/or property and shall remain in charge until authority is relinquished.” So you are required by law to follow all orders issued by the fire department at the fire scene. Firefighters may not know how to handle your horse, but they do understand what the fire is likely to do.

Evacuation is the most difficult task confronting you in the event of a fire. There are no set rules for how it should be accomplished. Each facility is different, so an evacuation plan must be designed specifically for your barn. Generally, you should evacuate the horses closest to the exit first.

If it's safe to enter the barn, evacuate horses one at a time, beginning with the most accessible horse. Blindfold horses only if absolutely necessary. Many will balk at a blindfold, making evacuation more difficult and time-consuming.

Horses must be led out and away from the barn; otherwise, in the confusion of the fire, they may attempt to return to the perceived safety of their stalls.

At each stall door, hang the horse's halter with a cotton lead rope snapped to it. A fire is no time to be hunting for equipment. Leather halters are preferable to nylon, because the heat of the fire could cause nylon to melt to the horse's skin.

Horses should be led, as quickly and quietly as possible, away from the fire. If they panic or get loose inside, they may run, bumping into other horses, people, and doorways. If they lose their footing and go down, other horses may trip over the first fallen horse, causing a pileup and compounding the difficulties.

The old movie scenes where horses were turned loose and ran through the fields and town were a great deal more romantic than practical. It is *extremely* unsafe for horses to be running free. In their panicked flight from danger, they may hinder firefighting operations, cause traffic accidents, attempt to run back to the barn, or otherwise harm themselves and others.

Ideally, horses should be led some distance away and securely tied. If the horses are turned out in a pasture, fasten the gate securely and make absolutely certain that no animal is left alone. Horses are intensely social animals. A horse left alone may try to escape to rejoin the rest of the herd.

What about the horse who is afraid to leave the barn? Horses react to fear either by fleeing or by remaining stubbornly where they feel most safe. When smoke and fire prevent them from seeing an immediate escape, they may try to remain in a “safe” place—in this case, the stall. If you can remain calm, you may be able to relax the horse and coax him or her from the barn.

Do not allow any people—even other horse owners or caretakers—to attempt to reenter the burning stable once evacuation is complete. Firefighters have all too often removed the bodies of people who safely escaped a burning building only to reenter it to look for a pet or personal valuables.

Fire Suppression Techniques

Fire suppression is any action taken to extinguish a fire. Because barns are so highly combustible, the time available for fire suppression may be limited. The fire department must be notified first, followed by animal evacuation. If enough time and assistance are available to accomplish these first critical steps, then you can devote attention to fire suppression. The primary sources for fire suppression are portable fire extinguishers, water supplies, and sprinkler systems.

Fire Suppression Warnings!

Never fight a fire if the fire is spreading or already large.

Never fight a fire if it could spread enough to block your escape route.

Never fight a fire if you haven't been trained in how to use a fire extinguisher.

Portable Fire Extinguishers

Every barn should have portable fire extinguishers. However, due to their small size, the usefulness of portable extinguishers in stable fires is limited. They are most beneficial when a fire is small and immediately discovered. Nonetheless, an extinguisher may contain the fire until help arrives.

Locate the extinguishers in plain view, near an escape route and at a height convenient for everyone to reach. Post signs indicating their locations. Extinguishers should be located near each exit, in the tack room, and near the electrical panel. For larger barns, install additional extinguishers every 30–40 feet along the aisle.

Every person who is normally in the barn should be trained in

how to correctly use a fire extinguisher. The size of the extinguishers should be limited in part by the physical strength of those expected to use them. A 20-pound extinguisher may be too heavy for some adults to handle. Consult your local fire department for advice on extinguisher size and location and for training in their proper use.

Extinguishers should be checked periodically and recharged annually. Fire protection companies will do this for you on a regular schedule.

Extinguishers carry a rating to designate which types of fires they are designed to fight. Type A extinguishers are for use on fires from ordinary combustibles (wood, cloth, paper, rubber, and plastics). Type B extinguishers can be used on flammable liquid fires (gasoline, oil, grease, tar, oil-based paint, lacquer, and flammable gases). Type C extinguishers are for use on energized (current-carrying) electrical wiring, fuse boxes, circuit breakers, machinery, and appliances. Multipurpose extinguishers are rated ABC.

Your extinguisher must be rated for the type of fire it's supposed to put out! Using the wrong type of extinguisher can make a bad situation worse. For example, water conducts electricity. Attempting to fight an electrical fire with a pressurized water extinguisher or a hose line will deliver a potentially lethal shock to the person handling the water. For general use around the barn, a multipurpose extinguisher is the best choice.

Water Supply

Many barn fires start in organic material or wood, so a water supply is critically important. The barn's water supply may be as elaborate as piped-in plumbing with individual water lines to each stall or it may be as basic as a single hand-pumped well or buckets carried by hand from another location. If you attempt to suppress the fire, you'll need to rely on the existing water supply until the fire department arrives.

For firefighting purposes an exterior water supply, located just outside the main exits, is better than an interior supply, because a fire might keep you from reaching an interior hose. A 5/8-inch diameter rubber or vinyl hose at least as long as the barn should

be kept on a reel. For barns longer than 50 feet, consider using two hoses, one mounted at each end of the barn. Keep in mind, however, that if the fire blocks access to one end of the barn, the remaining hose must be long enough to cover the entire length of the barn.

Be sure to check all hoses several times a year for signs of wear and repair as needed.

Beware of flat, woven-fabric hoses that may resemble a scaled-down fire hose—they are not the same thing! Do not, under any circumstances, rely on these hoses in any situation where you need water in a hurry. The flat hoses are more likely to kink and prevent the rapid passage of water.

Snap-on hose connectors can be time-savers if the hose is also used for daily operations. A spray nozzle should always be left attached to the hose. If this is not possible, it should be kept by the water source and equipped with a snap-on connector.



Fire Extinguisher Warnings!

Never use Type A extinguishers or water on electrical or grease fires.

Never fight a fire if you're not sure your extinguisher is the right one for that type of fire.





Part 3: Building a Fire-Safe Barn

IF YOU'RE PLANNING TO BUILD A NEW BARN, fire prevention should begin with the barn design. Because the interest in horse ownership has grown so rapidly, many communities have been unprepared for the sudden rush to build small barns. Both building and fire safety codes for barns have been either nonexistent or inadequate, sometimes hastily adapted from existing codes dealing with storage sheds and garages.

You should not assume that your architect, professional barn-building company, or construction company will be familiar with fire safety codes and construction requirements that apply to barns. Because there have been relatively few codes issued for barns and because previously constructed and approved noncommercial barns can't be inspected for fire safety without the owner's request, it's particularly important that fire safety be built in as much as possible.

Perhaps the two most important areas of consideration are construction materials and barn layout.

Use Fire-Resistant Construction Materials

There are many different construction methods for barns, but the most common one today is the pole building. Pole buildings are constructed around square or round wooden columns or laminated two-inch timbers set into the ground at intervals on the building perimeter. Wood or metal siding is the usual exterior finishing material. The roof is normally constructed with wooden trusses

Barn at the Northfield Mount Hermon School in Gill, Massachusetts, being built after burning.

and covered with metal sheeting or asphalt shingles. Because these buildings have no interior structural supports, nothing interferes with different stall configurations.

Another common building option is block. Concrete block and brick are excellent insulators, so these structures tend to stay cooler in summer and warmer in winter. Concrete or brick barns may be less likely to burn, but a fire inside such a structure may burn “hotter” because the construction materials more efficiently retain heat.

Although it’s more flammable, wood is usually the material of choice because of its moderate price and wide availability. There are several options to minimize the risk of fire when constructing a new wooden barn. First is the use of fire-retardant-treated wood (FRTW). Lumber and plywood that are pressure-impregnated with a fire-retardant solution reduce flame spread and the development of smoke, helping wooden beams maintain their structural integrity in a fire. For example, treated wooden trusses supporting a roof will be more resistant to structural failure in a fire, lessening the risk of a roof collapse, which would worsen a fire problem. FRTW is available in two types—one for interior application (weather-protected) and one for exterior use (weather-exposed). FRTW is stamped with its rating and other identification. If you specify FRTW, check the lumber or plywood to make sure the stamp is evident. If it isn’t stamped, don’t accept the delivery.

Second, fire-retardant paints and varnishes can be applied on both new and existing structures. Some types of fire retardants are added to paints to form a burn-resistant surface that slows the spread of flames. Other types of fire retardants are available in clear varnishes and a variety of colored coatings that can be sprayed or painted on. Check with your local paint supplier, lumberyard, or building supply company for more information about specific products.

Fire retardant materials will list a fire resistance rating. This rating indicates how long the material will withstand the passage of flames and not allow the fire to spread farther. For example, FRTW with a “two-hour” rating will hold flames from spreading beyond it for two hours.

Design Your Barn to Make Exiting Easy

All barns, regardless of size, should have a minimum of two exits, both easily accessible with no impediments to their immediate use. That is, don't allow doorways or aisles to become storage areas; doors in particular should never be blocked. Barns seem to invite clutter, particularly smaller barns with insufficient space for equipment. Resist the temptation to let infrequently used doorways or aisles become storage areas.

For more efficient removal of horses in the event of a fire, the following number of exits is recommended:

- 1–12 horses: 2 exits
- 13–24 horses: 3 exits
- 25–36 horses: 4 exits
- 37–50 horses: 5 or 6 exits

Ideally, you should be able to lead a horse into the aisle and then directly to the outside in a straight line.

Aisles should be wide enough to accommodate two handlers and two horses side by side. Longer aisles should be no less than 10 feet wide. Exit openings should be as wide as the aisle to prevent crowding at the doorway.

Doors should either slide completely open or open outward—they should never open inward. Latches should be easy to operate with one hand. Easily opened doors and latches will be a tremendous benefit when you have to lead a horse out quickly.

Locate your incoming electric supply away from any doorways so a fire occurring at the electrical panel will not make an exit unusable.

In barns where stalls are arranged in a long row down an aisle, a solid partition should be constructed after every fourth stall to separate it from its neighbor. This solid floor-to-ceiling partition will keep flames from jumping stall partitions into the next group of stalls, slowing the spread of a fire.

Because they are so flammable, hay and bedding should be stored in a separate building whenever possible. If hay must be stored in the building with horses, the best choice for storage is a ground-level storage room, completely separated from the stall area and enclosed with two-hour fire-resistant roofing and wall materials. If this isn't

an option, then upper-level hay storage is preferable to open ground-level storage because heat, smoke, and flames move upward. Should a fire begin on the second floor, upward movement of the fire will allow more time for evacuating horses from the lower level. The least preferable storage areas are those in close proximity to stalls. If there is absolutely no storage option other than adjacent to stalls, though, stack the bales at least 15 feet from the nearest stall.

Install a Sprinkler System

In recent years, news reports of large stable fires in urban areas have sparked interest in requiring sprinkler systems in horse barns. Sprinkler systems are the most effective lifesaving and fire suppression devices in any structure, including your barn. To be of benefit, the sprinkler system must have an adequate year-round water supply. It takes 500 gallons of water per minute to fight a hay fire of 250 bales. The sprinkler system must be able to supply a sufficient volume of water at high pressure. An automatic sprinkler system should certainly be considered as a retrofit for an existing barn or in the construction of a new barn, even if it isn't required by local building codes. The insurance savings alone may pay for the cost of the sprinkler system.

The National Fire Protection Association (NFPA) has developed standards for automatic sprinkler systems in racetrack barns. Smaller systems for private barns have become easier to install with the use of plastic pipes. In addition to being easier to handle, plastic pipes cost less than metal pipe systems, making installing sprinkler systems in existing barns more feasible. However, installing sprinkler systems is not a do-it-yourself job. A state-certified professional must conduct the installation.

There are two main types of automatic sprinkler systems in general use today: wet and dry. Both types rely on a wax seal or a fusible link (purposely made of a metal that bends or melts when heated) in the sprinkler head that keeps the water from discharging. Heat generated by a fire melts the seal or the fusible link, allowing water to disperse from the sprinkler heads.

Wet sprinkler systems have water in their pipes all the time. In

dry systems, water is maintained not in the pipes, but in a 250–500 gallon tank pressurized with nitrogen gas. The water in the holding tank is maintained at temperatures above freezing. The pipes remain filled with compressed air, which is released when the system is triggered. Dry systems are useful in colder northern climates where liquid water in the pipes of a wet system would freeze.

A municipal water supply with hydrants is a tremendous asset for fighting fires. Unfortunately, many stables don't have access to municipal water. If the stable has a pond on the property, a dry hydrant is an option. A dry hydrant is a water delivery system that uses six-inch or larger PVC pipe with a standard fire department connection. One end, with a strainer attached, is placed in a deep area of the pond that doesn't freeze in winter. The other end is on land, with a fire department connection that allows a pumper to hook up to the hydrant and draw water from the pond. For the system to be effective, the storage pond should hold at least 10,000 gallons.

If you don't have a pond but are considering having one built, have a dry hydrant installed at the time of construction. In either case, consult your fire department and state Department of Natural Resources for requirements, permits, or more information.

In the Midst of Tragedy

Do everything you can to prevent fires from starting. Remember, though, that fires may start despite your best prevention efforts. Some things are just beyond our control.

If a fire starts, try to save as much as you can, but when it's too late to save anything else, protect yourself by standing back. Be proud and thankful instead about how much you *did* save.





Part 4: Resources

The Humane Society of the United States

THE HUMANE SOCIETY OF THE UNITED STATES (HSUS) offers guidance on equine protection and care.

THE HUMANE SOCIETY OF THE UNITED STATES (HSUS)

Equine Protection
2100 L Street, NW
Washington, DC 20037
202-452-1100
humanesociety.org

Fire Safety in Horse Barns

LAURIE LOVEMAN'S WEBSITE provides the basic facts on fire prevention for horse barns and the latest news and tips to keep horse barns fire-safe.

Laurie Loveman
17095 Abbey Road
Chagrin Falls, OH 44023
440-543-1640
Fax: 440-287-6045
barnfires@alltel.net
www.laurieloveman.com

Sources for Product Information

Here are references for the manufacturers of the products listed in this guide. For additional manufacturers, check in equine publications or your local telephone directory.

Alerting Systems

THE PROTECTOWIRE CO., INC.

40 Grissom Road
Plymouth, MA 02360-7205
781-826-3878
Fax: 781-826-2045
pwire@protectowire.com
www.protectowire.com

Dry Hydrants

HEIMAN FIRE EQUIPMENT, INC.

2320 Northwest Blvd.
Ashton, IA 51232
1-800-831-8547
Fax: 712-724-6474
www.heimanfire.com

WATER-WAY COMPANY

1255 Shenandoah Road
Hamilton, AL 35570
1-877-806-3899
Fax: 205-921-7296
info@water-way.net
www.water-way.net

Fire-Retardant Coatings

FLAME CONTROL[®] COATINGS, INC.

4120 Hyde Park Blvd.
Niagra Falls, NY 14305
716-282-1399
Fax: 716-285-6303
flamec@flamecontrol.com
www.flamecontrol.com

NO-BURN[®], INC.

P.O. Box 299
Wadsworth, OH 44282
800-989-8577
Office: 330-336-1500
Fax: 330-336-5800
www.noburn.com

WALLA WALLA ENVIRONMENTAL

4 W. Reese Ave.
Walla Walla, WA 99362
1-800-247-9011
Fax: 509-522-0351
www.wvenvironmental.com

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DRICON® FIRE RETARDANT TREATED WOOD

Arch Wood Protection, Inc.
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Suite 250
Smyrna, GA 30080
770-801-6600 or
toll free 866-873-3789
Fax: 770-805-3283
www.dricon.com

HOOVER TREATED WOOD PRODUCTS, INC.

154 Wire Road
Thomson, GA 30824
1-800-832-9663
Fax: 706-595-8462
hoover@firtw.com
www.firtw.com

Organizations

AMERICAN FIRE SPRINKLER ASSOCIATION

12750 Merit Drive
Suite 350
Dallas, TX 75251
241-349-5965
Fax: 214-343-8898
www.firesprinkler.org

LIGHTNING PROTECTION INSTITUTE

25475 Magnolia Drive
P.O. Box 99
Maryville, MO 64468
1-800-488-6864
Fax: 660-582-0430
lpi@lightning.org
www.lightning.org

References

Arble, William C., and Murphy, Dennis J.
Fire Control in Livestock Buildings
(Ithaca, NY: Northeast Regional Agricultural
Engineering Service, 1989).

Fire Protection Handbook, 16th Edition
(Quincy, MA: National Fire Protection
Association, 1986).

*NFPA 150: Standard on Fire Safety in
Racetrack Stables*
(Quincy, MA: National Fire Protection
Association, 1985).

Additional information was provided by
the Ohio Division of State Fire Marshal
8895 E. Main St.
Reynoldsburg, OH 43068-3395
614-752-8200



Celebrating Animals | Confronting Cruelty



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OF THE UNITED STATES

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