

Mitigation Against Fires in Agricultural Buildings

Unfortunately, many of the basic principles of fire suppressive construction are not followed in the construction and maintenance of agricultural buildings. Reasons for this are the lack of codes that would require the enforcement of standards and the cost of construction and installation of more expensive building materials.

Several risk factors indicate some of the common causes of fires. It has been estimated that 80% of fires in agricultural buildings are due to faulty electric wiring. Also, fires occur most commonly in buildings 5 years old or more. This combination suggests that electric wiring may not have been installed correctly or that gases (ammonia, hydrogen sulfide) produced in the unit from livestock waste are corrosive to the wiring, making it more susceptible to ignition.

Demand for electricity is greatest in the winter months. This is also the most common time for fires to occur in agricultural buildings and residences (Fig. 10-4). The reason is believed to be the increased use of heating systems, the higher need for electricity, and perhaps the greater chance that electrical wires will be exposed to water (from rain, snow, and ice).

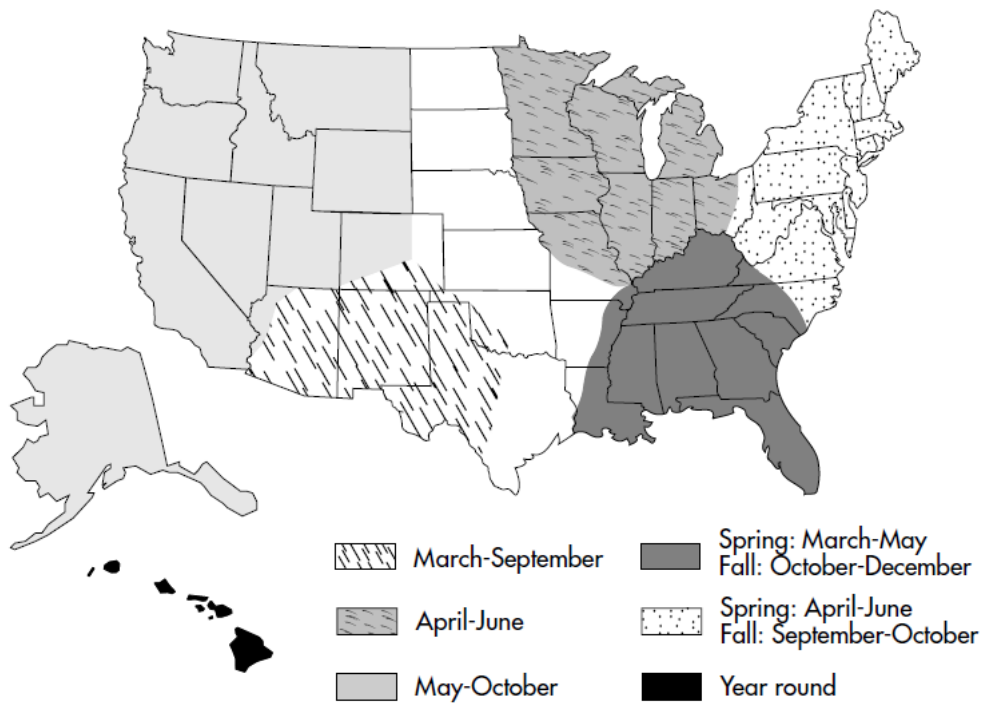


FIG. 10-4 Fire seasons by geographic area in the United States. (From International Association of Fire Chiefs, Finance Department: *Development strategies in the wildland urban interface*, ed 2, Fairfax, Va, 1996, IAFC.)

An additional problem that has been encountered in livestock and horse barns is that their construction may not control the spread of fire. Examples include the use of insulation materials that are not fire retardant, the lack of fire walls or stops, heating units that are poorly maintained or not approved by the Underwriters Laboratory, gas heaters, and the use of extension cords instead of permanent wiring. In some fires in intensively managed livestock barns there has been concern that fires spread because ventilation fans were thermostatically controlled. As heat from the fire increased, the fans ran faster, pulling the fire through the entire barn.

Fire Safety in Barns

Many barns are built of flammable materials, and some even have gas heaters. Simple measures such as fire extinguishers, smoke detectors, and no-smoking policies are often not in place or not enforced. Electrical wiring of barns is often substandard when compared with the most basic construction for humans. These deficiencies can be corrected, and professional advice is available. State Departments of Building and Fire Safety and most local fire departments and insurance companies provide low-cost or free detailed inspections and recommendations on fire safety.

Fires on farms occur most commonly in the summer and fall. Summer fires are often the result of electrical storms or spontaneous combustion of hot hay. Winter fires are caused by appliances, rodents' chewing through wires, or the accumulation of dust and cobwebs on electrical surfaces. Being able to identify potential fire hazards and to correct them is an important part of fire prevention and disaster mitigation. The types of material that contribute to the spread of fire are summarized in Table 28-2.

Table 28-2 Materials that contribute to fire risk

Combustibles	Accelerants	Ignition sources
Bedding materials (especially sawdust and newspaper)	Aerosol cans Gasoline Kerosene	Batteries Broken glass Chemicals that may react with each other, water or moisture
Cobwebs	Oil	Cigarettes and matches
Dust		Electrical appliances
Grain dust		Electrical fixtures
Hay and straw		Fence chargers
Horse blankets		Heaters
Paint		Motors
		Sparks from welding machines and machinery (tracks, tractors, mowers)

From Margentino MR, Malinowski K: *Fire prevention and safety measures around the farm*, New Jersey Agricultural Experiment Station FS 608, New Brunswick, NJ, 1992, Rutgers University Extension Services.

Farm owners should consult with the local fire department on how to fireproof barns and stables. Local collaboration is a preferred method, since it also familiarizes farm owners and local firefighters with one another, which is of tremendous help in an emergency. Simple factors (e.g., knowing ahead of time where a farm is located, how many animals are there, and where a large volume of water is available) can make all the difference between rapid, successful response and total failure in a fire.

Barn Construction

Construction of a new barn offers the best opportunity to have a building in which the risk of fire is reduced. Many fire safety features are mandated by local authorities; others will induce insurance companies to reduce their premiums. Examples of features that reduce the risk of fire and its spread are in Table 28-3.

Table 28-3 Construction features to prevent fire and its spread

Approved fire doors
Fire walls between hay and bedding storage and the stabling areas
Use of materials that are flame retardant or fire resistant
Use of fire-resistant latex paint (two coats)
Installation of smoke detectors, fire alarms, and sprinkler systems that can be monitored by the local fire and police departments
Trickle charge–battery powered emergency lighting to permit evacuation of people
A water source on the premises (e.g., a pond), the location of which is known by the local fire department

From Margentino MR, Malinowski K: *Fire prevention and safety measures around the farm*, New Jersey Agricultural Experiment Station FS 608, New Brunswick, NJ, 1992, Rutgers University Extension Services.

Electrical Systems

Areas of high moisture should be avoided for the location of main electrical panel boxes. Boxes should be placed in the driest, most dust-free area possible (not stall areas). They should be corrosion resistant and weatherproof even if they are installed inside a building.

Outlets and switches should be made of metal and have dust-tight and watertight, spring-loaded covers that close when released. Wires should be encased in metal conduit pipe (including temporary wires, such as extension cords) and must be out of the reach of animals. Light fixtures and bulbs should have covers that are dust and moisture resistant. A bulb also should be surrounded by a cage to prevent accidental breakage. Electric fence units are a potential fire hazard, especially if they are the continuous current type. Only UL-approved units with solid state transistors and intermittent current should be used. Fence line units should be at least 10 feet from buildings. Electrical appliances should have switches that are dust and moisture proof. Motors should not be within 18 inches of any combustible material (i.e., hay and bedding) and should be protected by a fire-resistant shield. All appliances in the barn should be UL approved. Cords and plugs should be in good repair. Appliances should be disconnected when not in use.

Portable heater units should not be used in barns or around animals. If heaters are used in tack room areas, they should never be left running unattended. Heater units should have shut-off devices in case they are knocked over. Heat lamps should be placed at a safe distance from flammable materials and should not be used with extension cords. Heat tapes and water tanks should be UL approved and listed. They should be installed by a professional plumber according to the manufacturer's recommendations.

Lightning Protection

Buildings should be equipped with professionally installed lightning rods of copper or aluminum and be properly grounded. All pipes, water systems, electrical systems, and telephone lines should be grounded. Professionals should install and maintain lightning protection systems.

Fire Extinguishers

All-class (ABC) dry chemical fire extinguishers should be placed in buildings where animals are housed, in workshops, and wherever welding is being performed. They should be at least 5 lb; 10 lb is ideal. Even if an extinguisher has been discharged only partly, it must be recharged.

Fire extinguishers should be hung at all exterior doorways, in the middle of long aisles, and next to the electrical panel box. Signs denoting placement of fire extinguishers should be highly visible.

General Safety

- Smoking should never be permitted in any barn, hay or bedding storage area, tack room, or lounge. No-smoking signs should be posted in these areas and at all exterior entrances.
- Exit doors should be clearly marked.
- Aisles should be raked or swept clean of hay and bedding. Cobwebs and dust should be vacuumed regularly. Light fixtures, outlet covers, switches, and panel boxes should be wiped off regularly.
- Areas around a barn should be kept free from weeds, twigs, and trash.
- Manure piles should be at least 20 feet away from the barn to reduce the chance of combustion fire.
- Hay and bedding storage should not be near lights, fans, electrical boxes, heaters, or outlets.
- Care should be taken to keep newly baled hay from becoming too hot, which could result in spontaneous combustion or mold growth. Adequate ventilation should be provided for additional drying of the hay bales.
- Flammable substances should not be stored in barns.
- Machinery and vehicles are best stored in a separate building.
- A fire hose and buckets should be available and kept for firefighting purposes only.
- Fire drills should be held regularly to familiarize staff and boarders (horse owners) with their responsibilities.