Electric fence is good fence, but

Only When it's HOT

Story & photos by ***Troy Smith***

In most parts of the country, it's hard to find a cattle producer who has not made use of electric fence. To temporarily enclose wheat pasture, cornstalks or other forage resources, a hot wire goes up fast and can be moved easily. Multi-wire electric fence can be made permanent, too, often providing a practical alternative to traditional barbed-wire fence. Hard-core advocates of electric fence will argue that it's a more effective barrier.

However, it's not hard to find a user with stories about electric fence failure. We're not talking about that fallen cottonwood tree or the spooked herd that tore down posts and wire. Such mishaps create holes in fences of any kind. We're referring to the electric fence that leaks cattle because it doesn't deliver the jolt needed to cure their wanderlust. After all, electric fence is good fence, but only when it's hot.

Fence contractor and consultant Wayne Burleson, Absarokee, Mont., has researched the subject for more than 20 years. He has applied lessons learned to the commercial construction of hundreds of miles of fence.

Grazier and fence supply dealer Randy Jenkins says he has made and corrected plenty of mistakes while fencing and refencing his own ranch near Broken Bow, Neb. He shares his experience and product knowledge while helping customers develop customized grazing systems.

Burleson and Jenkins agree most electric fences fail because they weren't installed or energized properly. Shocking power may be inadequate because of an inappropriate fence charger or energizer, or because it wasn't effectively grounded. Problems also arise due to fence design or to the materials used to construct it.

Energizers

Fence energizers are manufactured as 110-volt or 220-volt units that plug into the main electrical power supply or battery-powered units. At least one company produces a 110-volt plug-in model that may also be operated with a 12-volt battery. Solar-powered energizers draw power from a battery that is recharged by a solar panel. Whatever the type, make or model, they all serve the same purpose — to store electrons in a capacitor and release them in a pulse. That pulse is the jolt that is felt when coming in contact with an electrified fence wire.

►Fence supply dealer Randy Jenkins says fiberglass fence posts, such as this one with a pop-back feature, are gaining popularity.

"Energizer technology in New Zealand has been way ahead of the U.S., but the competition has resulted in better energizers being made here, too," Burleson says. "Most are low-impedance energizers, meaning they deliver a short pulse. They're safer and present much less fire hazard."

A high-impedance energizer, which creates long pulses, can leak electrical current. A low-impedance energizer delivers an intense pulse of very short duration (less than 0.0003 seconds), so heat will not build up in the fence wire.

Typically, energizer manufacturers rate their products in joules — a measure of the total amount of energy released per pulse. A joule is equal to the output of 1 watt per second. Generally, fences of longer distance will require more output. When matching a low-impedance energizer to a particular application, an industry rule of thumb suggests 1 joule per 6 miles of wire. When fence builders are planning to electrify multiple wires, they should consider the total distance involved. For example, a 1-mile-long fence with three wires will require an energizer capable of charging 3 miles of wire.

Manufacturers generally offer an estimate of how many miles of wire a particular model will energize. Jenkins says buyers are wise to be skeptical of these recommendations, as they usually are based on testing done under near-perfect conditions.

Burleson claims it is a good idea to set up the energizer and grounding system first, even before stringing the fence wire. When that chore is saved for last, it is often done too hurriedly, and mistakes are made.

Grounding

"The lack of adequate grounding is one of the most common challenges to maintaining an effective electric fence. A poor ground makes a poor fence," Jenkins states. "A lot of people ground a fence with a short steel rod — probably a rusty one at that. They drive it a foot or so into the dirt, wrap the ground wire around it a few times and call it good. I've done it that way myself, but it isn't good enough."

A powerful, high-quality energizer won't perform as expected unless it is properly grounded. For optimum performance, Jenkins recommends galvanized steel or copper grounding rods, ½ to ⅝ inch (in.) in diameter and 6 to 8 feet (ft.) long. They should be driven deeply into moist soil.

►For an effective ground, the ground wire should be securely fastened to the ground rod with a brass or stainless steel clamp.

"I recommend a minimum of 6 feet of ground rod for each joule of output," Jenkins adds. "A good ground can be hard to get when the soil is very dry, so multiple rods should be used. When installing a permanent electric fence, using three connected ground rods (placed 10 ft. apart) is always a good idea."

The type of wire used for making connections

should be appropriate for the type of ground rod used. If using copper rods, for example, use copper wire to connect the energizer's ground terminal to the ground rod and to connect multiple ground rods. Don't mix steel and copper. When different metals are connected, a chemical reaction (electrolysis) occurs, resulting in corrosion that reduces the effectiveness of the grounding system. When making connections, fasten wire securely to rods with clamps made for that purpose. Brass or stainless steel clamps are corrosion-resistant.

An effective ground can be difficult to achieve in very sandy soil or if the soil is extremely dry. The problem may be remedied by installing an additional fence wire with multiple grounds located at intervals along the fence's span. In this situation, animals attempting to breech the fence receive a shock when they come in contact with both the hot wire and the grounded wire.

Construction materials

When it comes to constructing an electric fence, the most commonly used materials are steel wire and polywire. The latter consists of polyethylene strands twisted together with stainless steel or copper filaments to carry the electric charge. Jenkins says copper filaments are more conductive (and usually more expensive), but less durable.

"For portability, it's hard to beat polywire. It's highly visible, lightweight and easy to handle. And, you can splice it by just tying two ends together. It works well for fairly short spans of temporary fence that [are] moved frequently. I use it for strip-grazing alfalfa," Jenkins adds. "On the downside, it's not as strong as steel wire, so it's short-lived by comparison."

Burleson says manufacturers have improved polywire by making the charge-carrying filaments bigger, but it still deteriorates with time and use. For fences spanning more than ¼ mile, he recommends high-tensile (high carbon content) steel wire. Many cattle producers have used soft 14-gauge (ga.) or smaller wire, mainly because it's cheaper.

"Small-diameter wire loses power over distance, and it breaks easier," Burleson notes. "I'm a believer in 12½-gauge high-tensile wire. It resists rust and doesn't break easily unless you crimp it. Crimps lead to breaks in any kind of wire. High-tensile wire is springy, so it won't stretch and sag as much over time. It's definitely the best choice for permanent electrified fence."

When splicing wire, it's important to create a good connection. A figure-eight knot is advisable for soft wire, but commercial splice-fasteners should be used with high-tensile wire.

Wood posts remain a popular choice for permanent electric fence. Specialized rubber tubing often takes the place of insulators when fastening high-tensile wire to wood posts. The tubing fits over the wire where it comes in contact with the post, and can be made secure with a staple. Burleson warns against driving staples so tight as to damage the tubing or crimp the wire.

For hanging temporary fence, many producers choose the small steel posts available at most farm and ranch supply stores. However, flexible fiberglass posts are gaining in popularity. Some are fashioned from used oil-field sucker rods. Jenkins warns that the recycled fiberglass posts tend to weather and develop splinters over time. Slick-finished, non-splintering fiberglass posts are produced commercially in a variety of sizes and styles. Some have hooks to hold fence wires, and others require clip fasteners to secure wire directly to the post. Since fiberglass does not conduct electricity, insulators are not necessary.

Of course, insulators are required when using steel posts. Burleson says some plastic insulators deteriorate with exposure to the sun. He urges fence builders to choose insulators that are resistant to damage from ultraviolet light.

"There are great differences in the quality of insulators available today. Cheaper ones do the job in the short term, but they won't last as long," Burleson adds.

Jenkins also warns against using porcelain insulators to fasten high-tensile wire at the corners or ends of a fenceline. They often crack under the tension.

Jenkins says placement of posts and the distance between them varies with the terrain. Uneven ground generally requires more posts and strategic placement, at low and high spots, to maintain the wire at the desired height. When covering relatively level terrain with polywire, Jenkins recommends placing posts at 50- to 60-ft. intervals. When using high-tensile wire, posts often may be spaced farther apart — up to 120 ft.

►With the use of fiberglass posts, wire insulators are unnecessary. A variety of fastener styles are available for attaching wire directly to the post.

A psychological barrier

Burleson says there is a tendency for many people to overbuild and underpower their electric fences. They think more wires and more posts make the fence better, but they try to use energizers with too little output. Except for permanent fences subject to heavy or frequent pressure, multiple-wire fences may be unnecessary.

"In many cases, one wire is enough. But if it's not hot, it might as well be a cobweb hanging on a tree," Burleson says. "Electric fence is not expensive to build, compared to other types of fence, so why scrimp on materials? High-quality materials usually are cheaper in the long run. And, never fudge on the energizer. You have to have enough shocking power."

"You do have to consider economics. There is no sense in wasting money, but it's best to use the right materials for the particular application," Jenkins adds. "You have to remember that an electric fence is a psychological barrier, not a physical one. It has to bite when an animal touches it, so the animal remembers and doesn't want to try it again."

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Some common mistakes

Electric fence specialists Wayne Burleson and Randy Jenkins advise livestock producers to consider the following common mistakes when building and maintaining an effective electric fence.

Too little power. Check the joule rating to make sure your energizer will deliver sufficient output and shock through vegetation when necessary.

Poor grounding. Use at least three galvanized steel or copper ground rods [6 to 8 feet (ft.) long], and install properly with appropriate connecting wire.

Wire too small. Larger-diameter wire carries more wallop.

Fence posts too close. A fence constructed of high-tensile steel wire is more flexible and will spring back after animals run into it, if posts are not too close together. Fewer posts will be knocked down, and fewer insulators will be broken or torn loose.

Accidental grounds. Avoid building electric fence too close to old, existing fences, where a stray wire may come in contact with the hot wire and short it out. Keep electric fence clear of all objects that could create an accidental ground.

Solar panels not facing the sun. For optimum performance from solar-powered energizers, the panel must face southwest, but no more than 20° from due south.