

LIVESTOCK FENCING

GUIDELINES 2013





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Proper fencing is essential for controlling livestock, protecting animals from predators, and good pasture management. These Livestock Fencing Guidelines describe three types of fencing used in Nova Scotia – electric, barbed wire, and page wire – and cover construction techniques, materials, and appropriate dimensions.

As a minimum all livestock farms should have a permanent perimeter fence capable of keeping the livestock on the owner's property. The perimeter fence should be constructed of sturdy posts and wire that is securely fastened with appropriate hardware. Livestock farmers with land in certain exposed areas – next to a major highway or a schoolyard, for example – may need to build their fences to a higher standard.

Any fencing system can fail due to circumstances beyond the owner's control. Examples include power outages, when an electric fence will not work, and snow accumulation, which may allow cattle to simply walk over the fence. Livestock may break through fences if they are roaming in search of food, so owners should ensure that adequate water and feed are readily available. In general, owners need to manage their fences on an ongoing basis to ensure they function continuously, and take the measures necessary to keep animals from escaping.

1. FENCING FOR LIVESTOCK

1.1 Cattle

Almost any type of common fencing material can be used to contain cattle. Considerations include the longevity, durability, and cost of materials, as well as the ease of construction.

Historically, barbed wire fencing was used for cattle enclosures. However, in recent years barbed wire has given way to electric fencing or a combination of electric fencing and other fence materials. Enclosures for cattle generally consist of an outside perimeter fence that is 110–120 cm (44–48 in) in height as well as temporary divisional fences used within the perimeter for pasture management.

Where bulls are separated from cows, fences should be made stronger using larger posts, heavier gauge wire, more strands of wire, heavier board rails, or similar reinforcements.

Within cattle handling facilities, which must be strong for heavy use, special attention should be given to the strength of the materials used. In addition, fencing should be constructed to a minimum height of 150 cm (60 in) to prevent escapes.

1.2 Horses

Visibility is the primary consideration in horse fencing. For this reason, board fences that the horse can readily see are ideal. Electric fencing is also effective, but should be constructed with visibility in mind: install more posts and place them closer together, use wider polytape wire, or hang ribbons from high-tensile wire. Page wire fences will also work, but a board or a strand of electric fencing should be included along the top to prevent the horses from reaching over the fence. Barbed wire, which can easily cut the animals' flesh, should not be used to fence in horses.

1.3 Sheep

Fences for sheep have a dual purpose: keeping the sheep inside the perimeter fencing, and providing protection from predators. A well-built page wire fence will serve a sheep farmer very well for many years. Electric fencing is also recommended. Barbed wire is not as effective, as the barbs quickly become clogged with wool.

1.4 Goats

Like sheep, goats are well served by page wire and electric fencing. In goat enclosures it is important that the fences are uniform and consistent without any gaps or weaknesses.

1.5 Swine

Strong fencing is essential for swine. Page wire, electric fence, and barbed wire are all options, although the height does not need to exceed 137 cm (54 in). Pay particular attention to the bottom of the fence in order to prevent swine from rooting and subsequently escaping. Electric fencing installed 30 cm (12 in) from the ground or a strand of barbed wire strung near the bottom of the enclosure will help prevent rooting.

1.6 Poultry, Game Fowl, and Ratite

Even feathered livestock need to be contained on the owner's property, so special attention is required if the birds can fly. Fencing material suitable for containing poultry, game birds, and ratite includes chicken wire, electric, chain link, and page wire. Ensure that the materials are strong enough for the type of bird being housed.

1.7 Training Livestock

Any untrained animal may try to go through a fence, so the success of all fencing depends on training livestock to respect the boundary. It will save many hours of time and manpower rounding up livestock and repairing fences if the animals are well trained.

When releasing young stock or turning out animals in the spring, try the following:

- Establish a small training area.
- Leave livestock inside the training area for a few days to become familiar with the fencing before putting them out to pasture.
- For electric fencing, place a charged wire inside a permanent corral or barnyard fence where there is little chance for animals to escape.

Since electric fencing is a psychological barrier rather than a physical one, it is particularly important to train livestock to respect the fence.

2. DESIGNING A FENCE SYSTEM

2.1 Permanent Fence

On level or rolling terrain, posts should be spaced every 2–3 m (10–12 ft). Fewer posts allow the fence to absorb impact and bend back rather than break.

In hilly areas, extra posts should be placed in both high and low spots to prevent gaps and fence failure. All permanent fence systems require strong braces at corners and, for very long fence lines, within the line (*see Section 2.2 Fence Braces*).

2.2 Fence Braces (Corner, Gate, and Midline)

In order to properly hold up the fence, gate and corner braces must be constructed correctly. The most common design is the H brace (*Fig. 1*). Try the following construction tips:

- Corner posts should be large: 10–15 cm (4–6 in) in diameter and 2–2.5 m (6.5–8 ft) long.
- Brace posts should go in the ground to a depth of 1 m (3 ft) and spaced no less than 2.5 m (8 ft) apart.
- For strength, a horizontal crossbar should be spiked between the brace and end posts. Then a guy wire should be attached to the brace post, under the crossbar, extending to the bottom of the end post; the guy wire can be tightened with a tension device left on the wire.

Fences with more than five wire strands require a double H brace. Fences more than 200 m (650 ft) long require midline braces.



photo source: Perennia

Fig. 1 The “H” brace with tension wire and tension device.

Animal	Number of Wires	Wire Height (cm)	Minimum Voltage
Cattle	1-2 (int) 2-3 (bdry)	81-106	3,000
Sheep/ Goats	3-5 (int) 5-6 (bdry)	46-61	5,000
Predators	6-9 (bdry)	120+	5,000

Fig. 2 Suggested permanent electric fence heights for various livestock classes (int = interior; bdry=boundary)

2.3 Electric Fencing

Electric fencing is the most versatile fencing option available. In addition to being relatively economical, electric fencing can be set up to control all classes of pastured livestock. It also can be combined with other fence types to provide extra protection. When properly installed, electric fences can last for 20 years or more.

Electric fencing can be used for boundary and interior fencing, and as either a permanent or temporary installment. It can also be used in areas where other types of fencing are not convenient, such as where the fencing must be moved fairly regularly. (Fig. 3)

This figure shows a ground return system with live and ground wires attached to the post.

An electric fence is not designed to be used as a physical barrier. Rather, it is meant to be a psychological boundary – the memory of a previous negative experience (receiving a shock) deters the animal from attempting to cross the barrier again.

The top wire should always be hot to prevent animals from leaning over and pushing the fence. As well, a predator fence should always have a hot bottom wire. Always position one hot wire at the shoulder height of the animal to be controlled.

When first setting up a temporary fence, check the voltage at a point as far away from the energizer as possible. It should not be less than half of what it was before the fence was connected; if it is, and assuming that the ground is functioning properly, a more powerful energizer may be required.

2.3.1 How It Works

The energizer (also called fencer or charger) generates short, high-voltage impulses that are sent through the fence line. When an animal touches a live wire, the circuit is completed because the current travels through the soil to the ground rods and back to the energizer.

In electric fence systems, voltage typically ranges from 3,000–10,000 volts (3–10 kV). The quantity of energy (joules) is partly what deters animals from touching the fence. Voltage is also important because a certain amount is required to overcome resistance (e.g., wool) and allow the energy to flow. The minimum voltage should be above 3 kV to be effective for most large livestock; however, sheep and other animals with heavy coats

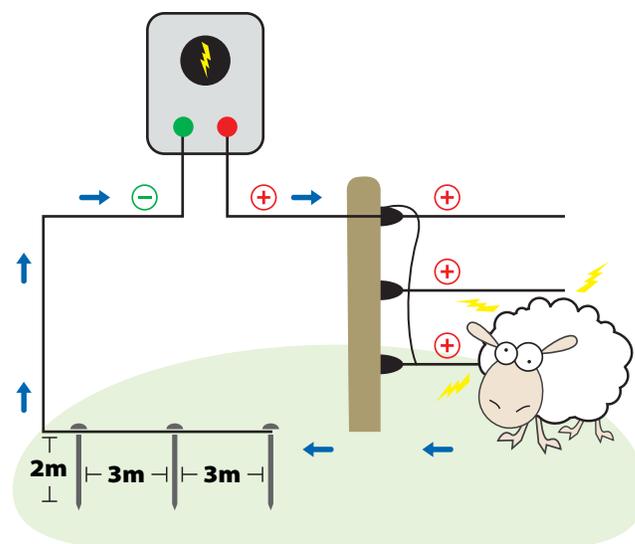


Fig. 3 The circuit is complete when the animal touches the wire. This figure shows the correct ground rod placement.

2. DESIGNING A FENCE SYSTEM

require a higher voltage (above 5 kV). Most problems with low voltage can be attributed to insufficient ground or inadequate system components that are grounding out the system.

2.3.2 Types of Fencing Circuits

There are two types of electric fence systems: an all live wire system or a ground wire return system. An all live wire system works well in regions with fairly even rainfall and green vegetation for most of the year. A ground wire return system is used where there is low rainfall, or where soil conditions are stony, dry, or frozen.

Because an all live wire system depends on the electrons to travel easily through the animal, into the soil, and up into the grounding rods back to the energizer, it requires the higher conductivity of moist soil. A ground wire return system depends on the current to go back to the energizer by way of a ground wire in the fence line. This setup can work in the same manner as the all live wire system, but in a ground wire return system animals can also complete the circuit by touching a live wire and a ground wire at the same time.

2.3.3 Components of Electric Fences

Electric fences systems have a variety of components and options that can be used to save time and/or manpower on the farm.

The selection of components will depend on how the fence will be used. Longer-lasting materials are more important for permanent and boundary fencing than for portable fences. Permanent and boundary fences usually employ very durable 12.5 gauge, high-tensile wire. Temporary fences are typically constructed with one to three strands of visible wire on portable step-in posts or tumble wheels. These fence posts should be highly insulated, using either fibreglass or plastic posts, or steel posts with high-quality insulators. Acceptable materials include various gauges of steel wire, polywire, and polytape.



photo source: Perennia

Electric net fencing is useful to contain sheep and deter predators since the entire net is electrified. This style of fence can be strung more quickly than running three or more strands of wire. Great care should be taken when using electric net fencing around lambs as they can easily become entangled.



photo source: Perennia

Electric Tumble wheels are convenient when the temporary fence needs to be moved frequently. Only one strand of polywire is required to contain the cows.



photo source: Perennia

Reels are also useful for moving temporary fence. They can be assembled so that several attach onto a post, allowing a three- or four-strand fence to be moved in one effort.



photo source: Perennia

Using offset brackets positioned either on a fence post or the fence itself, electric fence can be used to protect existing barbed wire or page wire fence. This may eliminate the need to replace an entire fence.

2.3.4 Choosing a Fence Energizer

Purchase a fence energizer that is suited to the class of livestock from a reputable dealer who understands the complexities of electric fencing and the grounding requirements. In general, low impedance energizers are a better choice because they increase the shock through the line if vegetation touches the fence. Solar or battery-operated energizers are useful in remote locations, but can be more expensive and require more maintenance. Such components are also attractive to thieves.

2.3.5 Installing the Ground System

A poor ground system is the cause of the majority of electric fence failures. It is imperative that the ground system is installed correctly in order for the circuit to be easily completed.

- There should be a minimum of three rods, with one ground rod for every five joules of fencer power (e.g., a 25-joule fencer will require five ground rods).
- The ground rods should be 2 m (6.5 ft) long in order to reach permanent moisture, and separated by a minimum of 3 m (10 ft).
- Choose an area that is normally damp, and avoid covered areas (e.g., not in or beside a barn).
- To avoid stray voltage, keep a minimum of 15 m (50 ft) from a utility ground rod, underground telephone or power cable, underground water pipe, or milking parlour.
- Use a ground rod clamp to attach insulated cable or bare 12.5 gauge wire to the ground rod farthest from the charger. Run the wire to the next rod and attach it with a clamp; repeat; after the last one, attach the wire to the ground terminal on the charger.
- Test the ground system with a volt meter that reads down to 100 volts. Measure the ground wire between the energizer and at least one metre from the first ground rod: if more than 200 volts is measured, more ground rods are required.

By alternating the ground and live wires on the fence, the circuit is completed when an animal touches both wires at the same time. The ground wire in the fence can easily short out the system if conductive material joins both wires. Keep the fence clear of vegetation.

This figure shows a ground return system with live and ground wires attached to the post (*fig. 4*).



photo source: Perennia

Fig. 4 This figure shows a ground return system with live and ground wires attached to the post. Note the additional ground rod to ensure good grounding.

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2.3.6 Gates

Always run electricity under a gate using heavy-duty insulated cable that can be threaded through a plastic pipe. If the gate itself is electrified, connect it so that the gate is unpowered when unhooked. This way it will not drain the power from the fence when it rests on the ground (*Fig. 5*).

2.3.7 Tips for Electric Fencing

Remember that visibility and power are more important than height to control animals.

Cattle

- Perimeter fence: 2–4 strands is sufficient.
- Height of permanent fences should be 1 m (40 in). Wires should be spaced about 30 cm (1 ft) apart.
- Interior fence: 1–2 strands is sufficient.
- Height of temporary fences should be no less than 90 cm (36 in). Wires should be spaced about 30 cm (1 ft) apart.
- Voltage should be at least 3000 volts to hold all classes of cattle in.

Sheep

- Since sheep are more insulated by their wool, a ground return system may work better to increase the amount of shock delivered.
- Perimeter fence: 5–6 strands is sufficient.
- Wire spacing of permanent fence: bottom three wires are 15 cm (6 in) apart; next wire should be spaced 25 cm (10 in) apart; highest wire spacing should be 30 cm (12 in).
- Interior fence: 2–4 strands is sufficient.
- Wire spacing of temporary fence: bottom wire 20–30 cm (8–12 in) off the ground, and others separated by 30 cm (12 in).
- For added predator protection, increase the number of wires. Another option (although harder to maintain) is to install a low, electrified offset wire around the exterior of the perimeter fence 30 cm (12 in) out and 15 cm (6 in) off the ground.
- Voltage should be a minimum of 5000 volts to effectively deter sheep from pushing through.



photo source: Perennia

Fig. 5 Five or six strands are sufficient for boundary sheep fencing.

2.4 Barbed Wire Fencing

Barbed wire fences are primarily used for cattle. Generally this type of fence consists of wooden posts and no fewer than three wires on the perimeter. The wires may be either the traditional double-strand barbed wire or the newer single-strand type.

Anchor, corner, and stretch posts must be wood, but line posts may be wood or steel. Some woods like cedar can last 10–15 years under typical field conditions in Canada. Other woods are less durable and should only be used if they are pressure-treated.

Because galvanized fence wire is often sound after 10–15 years of exposure, it pays to use pressure-treated wood or galvanized steel fence posts, even if the initial cost is greater. Pressure-treated posts are recommended as they can be painted and are safer to handle than wood treated with other preservatives.

Staples should be 38–45 mm (1½–1¾ in) galvanized steel, and should be driven obliquely at a slight downward angle. When stapling the wire to line posts, do not hammer the staples tight to the fence post. About 3 mm (1/8 in) space should be left so that when the fence is stretched the wire can move and achieve even tension.

At initial construction, start the wire at the corner post by wrapping it around and stapling it to the post. Tension the wire at a braced post at the opposite end from where it is first attached, and attach it to the line posts with staples. When adding a new piece of wire to lengthen the line, use a wrap splice (wrap the two ends to be joined around each other four times)

2.4.1 Tips for Using Barbed Wire

- Wear good gloves.
- Use 12 gauge double strand wire.
- Use 38–45 mm (1½–1¾ in) staples.
- Posts should be CCA pressure-treated wood, 200 cm (6.5 ft) long, pounded into the ground leaving 137–150 cm (4.5–5 ft) above ground.
- Posts should be 2–3 m (10–12 ft) apart.
- Wire should be approximately 30 cm (12 in) apart.
- Double-wrap wire on corner posts – no staples.
- Make straight runs where possible.
- Staple one per wire on posts – do not tighten on wire.



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- Corner posts tend to pull out from tension; use either deadman brace in the ground or cross-brace.
- Most conditions in Nova Scotia allow crowbar holes. Pound with maul (typically 20 lb.) or tractor bucket.
- Use good proper fence pliers from a hardware or farm store.
- Place wire on “inside” of pasture where possible so cattle will push wire against post.

2.5 Page Wire Fencing

Page wire fencing, which can be used for a broad range of livestock classes, is a common fence material found on many farms throughout the region. Fencing manufacturers supply a variety of fence heights, wire sizes, and wire spacing to suit every need.

For cattle and horses, use fencing 105–120 cm (42–48 in) high. For sheep and pigs, use fencing 80–90 cm (32–36 in) high. For extra security, add a barbed or electric wire to the top of the fence. If fencing sheep, the electric wire should be near the bottom of the fence.

Corner and brace posts should be constructed as described in Section 2.2 Fence Braces. In new construction, once the posts are in place and pounded into the ground, the page wire is rolled out and lifted into place. There should be some tension on the wire to prevent sagging.

2.5.1 Tips for Using Page Wire

- Wear good gloves.
- Use 38–45 mm (1½–1¾ in) staples.
- Posts should be CCA pressure-treated wood, 200 cm (6.5 ft) long, pounded into the ground leaving 137–150 cm (4.5–5 ft) above ground.
- Posts should be 2–3 m (10–12 ft) apart.
- Use straight runs where possible to minimize corners.
- Staple every wire that crosses the posts – do not tighten on wire.
- Corner post may tend to pull out from tension; use either deadman brace in the ground or cross-brace.
- Most conditions in Nova Scotia allow crowbar holes. Pound with maul (typically 20 lb.) or tractor bucket.
- Use good proper fence pliers from a hardware or farm store.
- Place wire on “inside” of pasture where possible so cattle will push on wire.



3. FENCING PROBLEMS AND CHALLENGES

- Run-out pasture, overstocked fields, or no supplemental feeding can result in cattle becoming discontent and looking for new grazing areas. Cattle are often lured by after-grass from hay land, neighbouring fields, and apple trees.
- Broken areas or weak spots indicate poor fence maintenance. The cause could be that post spacing is too far apart or broken posts have not been replaced.
- Weather or an unwanted animal can spook cattle and nothing will keep them in; however, this is not a common occurrence.
- Neighbouring bulls can compete between the fences and destroy a fence line, so it is not good practice to introduce competing bulls between fences.
- When vehicles are accessing a barnyard, gate management may be neglected and the gate left open, causing livestock to escape along the roadway. Generally they don't go far, but animals on the road are an extremely dangerous collision risk to motorists.
- Electric fences are great protection when they are working; however, they require management and it is important to prevent grounding by weeds and trees. Power can be turned off accidentally; batteries go dead; or, a break can occur, which is often noticed once the cattle are out. The frequency of electric fence outages should be minimal on a normally operated farm.
- Proper grounding of electric fences is critical. See Section 2.3.5 Installing the Ground System.
- All posts should be 46–60 cm (1.5–2 ft) in the ground.
- Wooden posts should be pressure-treated or well maintained.
- Temporary fences are often used for short grazing times on hay fields or flooding areas. Cattle with calves should have a minimum of two electric wires. One strand of electric fence can contain cows on a temporary basis, if adequate pasture is provided.
- Fences are only as strong as the weakest link.
- Livestock can become discontent if they face low water, poor water quality, or large walks for water access.
- Riverbanks, wooded areas, and other natural barriers are not considered fences.
- Often older fences will have had an offset electric wire 20–25 cm (8–10 in) from the post and 60–90 cm (24–36 in) off the ground. This generally extends the life of older fences and introduces electricity to the livestock.



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