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Construction of High Tensile Wire Fences[1]

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High-tensile fencing was developed in New Zealand several years ago and is now coming into use in Florida. This fencing system uses smooth 12-1/2 gauge wire with a yield strength of 200,000 pounds per square inch, or a strength of 1,600 pounds for each wire. Conventional fencing wire normally has a yield strength of less than 60,000 pounds per square inch. A conventional 12-1/2 gauge wire will yield at tensile force of less than 500 pounds and break at less than 550 pounds.

Each wire in a high-tensile wire fence is stretched with 250 pounds of tension. The wires are held along posts or combinations of posts and spacers called battens, stays, or droppers. The wire is flexible enough to bend, wrap, tie in knots, or to be clamped with crimping sleeves. Tension in the wire is maintained by permanent in-line stretchers or tension springs. The use of high tension in the wire reduces sag in the wire. The higher tension in the wire requires the use of strong end- and corner-brace assemblies. Some advantages of high-tensile fencing are that it:

- is easier to handle than woven or barbed wire,
- has no barbs to injure livestock,
- has a longer life,
- has low maintenance needs,
- has a neat appearance,
- is easily electrified,
- is less expensive for most applications than barbed or woven wire fences,
- requires less time to erect,
- requires less time to repair, and
- requires fewer posts.

The main disadvantage of high tensile fencing is that cattle may slip through the smooth wire easier if the wire is not electrified. Also, animals tend to rub on non-electrified smooth wire fences.

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FENCE LAYOUT

The location of the fence must be determined before the start of construction. Property boundaries should be checked and laws regulating fences must be complied with. Check with utility companies about the location of buried cables and pipes. Locate problem areas such as bogs, steep slopes, or areas prone to flooding. Decide exactly what purpose the fence is to serve. Field size, access to water, soil type, and efficient movement of cattle should be prime considerations when planning fences. Many management systems use electric fences. High tensile fencing works well with electrified wire.

Future plans for the enclosed area should also be considered. Gates should be located for the efficient movement of machinery and livestock.

Fence lines should be laid out using surveying equipment if possible. Remove all brush, trees, and other obstructions along the entire fence line before building any fence. Mow grass shorter than the height of the lowest wire. Level the ground along rough fence lines. Leave a path wide enough to drive a vehicle on either side of the fence.

MATERIALS

The best results will be obtained using 12-1/2 gauge wire with a yield strength of at least 200,000 pounds per square inch. Staple pullout can be reduced by using 1-3/4 inch, 9 gauge, hot-dipped, galvanized staples with slash cut points. Battens can be used to maintain wire spacing in place of more expensive line posts. Battens may be wood, steel, or fiberglass. Angle groove battens are made to hold the wire in place without clips; straight groove battens require the use of wire clips.

The most suitable material for posts to be used in high-tensile fencing is pressure treated soft wood, usually Southern Pine in Florida. All wood posts used in Florida should be pressure treated and purchased only from a dealer who can certify the treatment offered, as improperly treated posts are one of the weakest links in a fencing system.

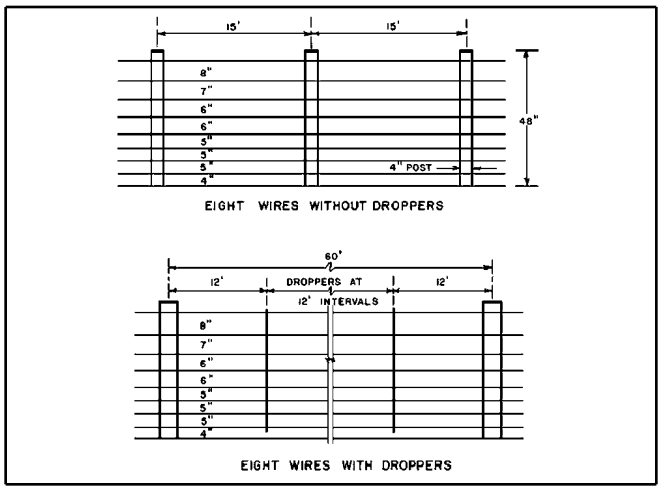

Figure 1. High-Tensile Wire Spacing.

TYPES OF PRESSURE TREATED POSTS

Three types of pressure treated posts are available in Florida. Creosote-treated posts have excellent resistance to insect damage and decay. They absorb little moisture and have good resistance to grounding when used for electric fences. There are some disadvantages of creosote-treated posts. Paint does not adhere to creosote, and contact with creosote irritates the skins of workers and may damage the hides of sensitive livestock. Creosote posts should contain at least 8 pounds of creosote per cubic foot and meet the requirements of AWPA (American Wood Preservers Association) Standard C-16.

Another wood preservative suitable for protecting fence posts is CCA (chromated copper arsenate). Posts treated with this material are dry and can be painted. CCA pressure treated wood posts should meet AWPA Standard P-5. Posts treated with CCA should contain at least 0.4 pounds per cubic foot.

Penta-chlorophenol-treated posts are presently available in Florida, but because of concerns about the presence of carcinogenic compounds called dioxins in this material, penta-treated posts may not be available in the future. Penta treated posts can be painted. They should not be used around dairies or operations involving foodstuffs. Penta is very effective in the prevention of decay and insect damage. Penta treated wood posts should meet the requirements of AWPA Standard P-8. Posts treated

with penta should contain at least 0.4 pounds per cubic foot.

CONSTRUCTION

The first step is to install a starting end or corner assembly. Then run out a single wire which will become the bottom wire of the fence. If battens are not used, set the posts on 15-foot centers. When battens are used, greater distances between posts can be used. Posts driven into the ground have greater holding power than hand set posts. Line posts should be embedded at least 2-1/2 feet. Use double brace line and end assemblies. Line brace assemblies should be placed at 650 foot intervals on straight runs and at the top and bottom of slope changes. This type assembly will hold loads of 9,000 pounds. For safety and strength, twitch sticks should be secured to the brace with wire and staples. Once the line posts are set, the remaining wires can be run out. A tension of 250 pounds is applied to each wire with an in-line stretcher. Wear heavy gloves and eye protection when applying tension. When fabricating fences, stand on the opposite side of the post from the wire. Use tension springs to maintain the tension in each wire. The stretcher needs to be near the center of the span for the best results.

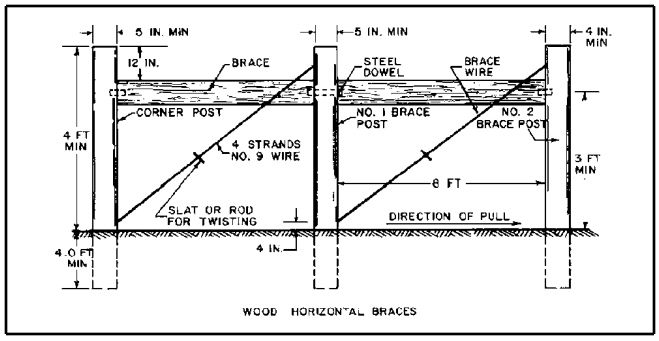

Figure 2. Corner and End Brace Assemblies.

Posts may be round or square. Wood corner and end posts should be a minimum of 5 inches in diameter. Wood brace posts should be at least 4 inches in diameter. Braces should also be 4 inches in diameter.

Battens, stays, or droppers can be used to reduce material costs by lowering the number of line posts used. Wire separation can be maintained as well by a batten as by a line post. When battens are used, line posts can be spaced up to 60 feet apart on level terrain. Space battens at 12-foot intervals. They should be attached after the final wire tension is applied.

Knots can be used to attach wires to posts or to splice wires. They are economical and convenient, but can slip at 60% of the breaking strength of the wire. Mechanical fasteners are quick and strong. If properly installed, they will not slip or weaken the wire.

As staples are driven into wood, the flat faces of the slash cuts on the legs cause the legs to curve. For the greatest holding power, staples should be driven so that the legs curve outward within the post. To do this, rotate the top leg 45 degrees off vertical away from the flat surface of the staple leg. This will result in greater holding power for the staple. Line wires should be stapled after applying about 100 pounds of preliminary tension. Do not drive staples all the way into the wood. Leave about 1/4 inch of clearance between the staple and wood to allow the wire to stay at uniform tension and to easily expand and contact with temperature changes. Staple wires on the side of posts next to livestock unless it is necessary to run the wire on the outside of curves.

All nonelectric fences utilizing steel wires on nonconductive posts must be grounded to protect humans and livestock from lightning and fallen electrical wires. A ground should be installed every 300 feet in moist or damp soils. Grounds should be used every 150 feet in dry, sandy, or rocky soils. Grounding electrodes should be a standard galvanized steel post or a 3/4-inch galvanized steel pipe driven in firm earth to a minimum depth of 3 feet. All wires should be connected to the ground rod. The continuity of wire fences should be broken at maximum intervals of 1,000 feet by means of a wooden gate, wooden panel section, or insulating material.

By following the principles outlined here, a high-tensile wire fence can be a satisfactory alternative to conventional barbed or woven wire systems.