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Fencing Materials For Livestock Systems

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Good fencing protects and confines valuable livestock by presenting barriers to restrict animal movement. Barriers may be physical, psychological, or a combination of both. Physical barriers consist of enough materials of sufficient strength to prevent or discourage animals from going over, under, or through the fence. Psychological barriers depend upon inflicting pain to discourage animals from challenging a physical barrier of inferior strength.

Traditional livestock fencing materials have included barbed, woven, mesh, and electrified wire, and combinations of these materials. Board fences have also been popular. These conventional materials are still widely used and make excellent fences if properly constructed. However, new materials such as high tensile wire should also be considered when selecting fencing types.

The type of fencing needed for livestock confinement depends on several factors including animal species, age, breed, and production system. Beef cattle on a controlled grazing system have different fencing needs than horses on recreational pasture. Permanent boundary or division fences require different fencing materials than fences for temporary paddocks.

Fencing type and material influence the cost, lifespan, and function of the fencing system. This publication discusses the types of fencing and materials that are available for livestock systems and provides some guidelines on fencing material selection for various livestock types.

Fencing Types

Factors for selecting fencing type include affordability, maintenance, durability, and effectiveness of containing livestock. Fencing types vary from physical barriers such as woven wire and board fences to psychological barriers such as electrified poly wire or tape. High tensile electric fences are a combination of both barrier types.

Woven Wire Fences

Woven wire fences consist of smooth horizontal (line) wires held apart by vertical (stay) wires. Spacing between line wires may vary from 1 1/2 inches at the bottom for small animals to 9 inches at the top for large animals. Wire spacing generally increases with fence height.

Woven wire fences are available in numerous combinations of wire sizes and spacings, number of line wires, and heights. Most fences range in height from 26 to 48 inches. Stay wires should be spaced 6 inches apart for small animals and 12 inches apart for large animals.

The standard design numbers listed on the manufacturer's tag (attached to fence rolls) describe the fence (Figure 1). For example, a design number of "1047–12–11" indicates that the fence has ten line wires and is 47 inches high, has 12 inches of spacing between stay wires, and has 11-gauge filler wires (wires between the top and bottom line wires).

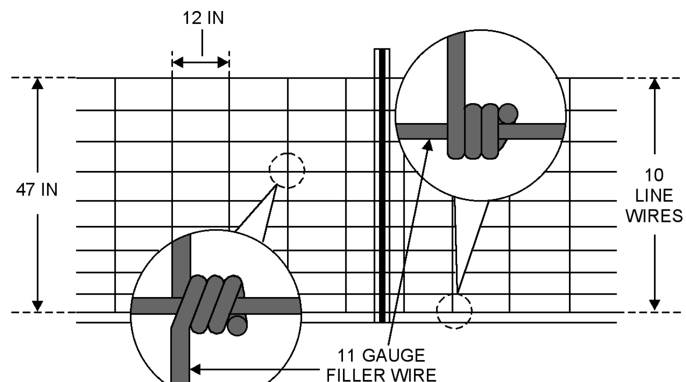

Figure 1. Design numbers assigned to woven wire fences (e.g. "1047 – 12 – 11") indicate the number of line wires (10), height (47 in), stay wire spacing (12 in), and filler wire size (11 gauge).

Barbed Wire Fences

Barbed wire consists of two or more strands of smooth, galvanized wire twisted together with two or four sharp barbs spaced every 4 to 5 inches. Standard barbed wire fences usually have three to five strands of barbed wire stretched between posts. Typical fence height is either 51 or 54 inches. Spacing between wires depends on the number of line wires and fence height (Figure 2). Line posts are usually spaced 12 to 20 feet apart.

Suspension barbed wire fences consist of four to six strands of 12 1/2-gauge barbed wire stretched taut so no more than 3 inches of sag exists between posts. The wire strands are held apart by twisted wire stays or plastic battens or droppers spaced 16 feet apart. Line posts are usually spaced 80 to 120 feet apart.

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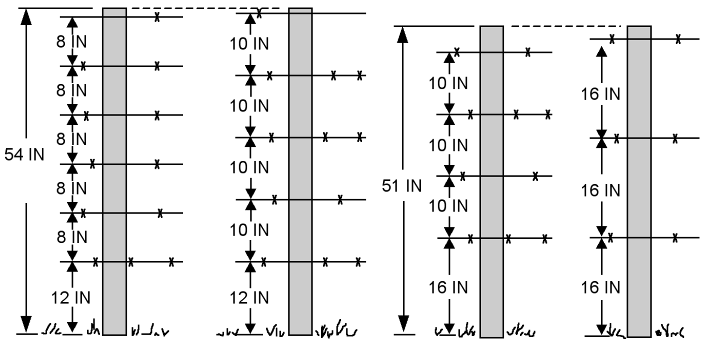

Figure 2. Common wire spacings for barbed wire fences.

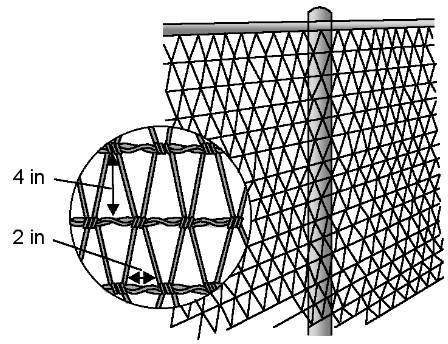

Figure 4. Detail of a diamond-mesh fence.

Cable Wire Fences

Cable wire fences are expensive and generally used for confinement areas. These fences consist of 3/8-inch steel wire cables stretched between anchor posts. Fence height varies from 60 inches for a 4-cable fence to 72 inches for a 6-cable fence.

A heavy-duty spring is fixed to one end of each cable and attached to an anchor post to absorb the shock on the wires caused by animal contact. The fence may consist of as many cables as desired, although a 6-cable fence is recommended for large animals. This fence has become less popular in recent years; 10-strand high tensile electric fence has taken its place.

Mesh Wire Fences

Mesh wire is made in 11, 12 1/2, 14, and 16 gauges and fences are available in diamond-mesh and square knot designs. Fence height generally varies from 50 to 72 inches. The square knot wire design is formed from single line wires spaced 4 inches apart and stay wires spaced 2 inches apart (Figure 3). The joints are held by a piece of short wire formed into a knot.

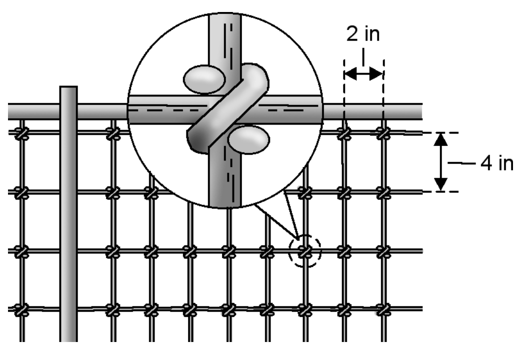

Figure 3. Detail of a square knot-mesh fence.

The diamond-mesh wire design uses two smooth wires spaced 4 inches apart and twisted together for all line wires (Figure 4). Stay wires consist of single smooth wires the same size as the line wires. These are wrapped around adjacent line wires to form a triangle with a 2-inch base. The diamond shape is formed when two of these triangle bases are fitted together.

Both mesh fence designs are strong and highly safe for animals. However, these fences are expensive and used primarily for confinement areas or small acreages. Mesh wire fence is priced similarly to woven wire fence on a per roll basis, although mesh wire rolls typically contain 1/3 of the fence length found in woven wire rolls.

Board Fences

Board fences are made from 1- to 2-inch thick, 4- to 6-inch wide boards nailed to flat-sided wooden posts (see Fencing Materials and Equipment section). Board fences can be built to any height, although 4 1/2 and 5 foot heights are most common.

Posts are typically spaced at 8 feet. However, board length should always be checked before deciding on spacing. For example, if 16 foot boards are purchased, the posts cannot be driven straight enough to attach the boards every 8 feet and post spacing must be decreased.

Board fences are strong, attractive, and safe for animals. However, these fences are often built incorrectly by placing the boards on the wrong side of the post to maintain aesthetics. Boards should always be attached to the side of the post facing the livestock. Otherwise, animals tend to push boards off the post when they lean or push themselves against the fence.

Board fences are expensive to build and maintain. Furthermore, the addition of one more board significantly increases the amount of materials needed or the labor required to build and maintain the fence. Labor is considerably higher for board fences than for most wire fences. Other disadvantages include splintering, breaking, and rotting of boards.

High Tensile Fences

High tensile fencing is easy to handle, requires little maintenance, and can be relatively low-cost. This type of fencing can withstand livestock contact and low temperature contraction without losing its elasticity. High tensile wire undergoes reduced stretch or sag, which is commonly associated with conventional fence wire. This type of fencing is not recommended for horses unless electrified versions are used and the owner is willing to accept some risk of injury. For more information on fencing systems for horses, see "Horse Fencing 101" available from Augusta County Cooperative Extension.

High tensile fencing is constructed with 11- to 14-gauge wire with a tensile strength of 170,000 to 200,000 pounds per square inch (psi) and breaking strengths of approximately 1,800 pounds. Wires are held in tension along posts spaced 16 to 90 feet apart. At installation, each wire is tightened with a permanent in-line strainer (Figures 5a and b) and is set at 200 to 250 pounds of tension. In-line strainers should be placed near the middle of the fence line to provide the same tension in both directions.

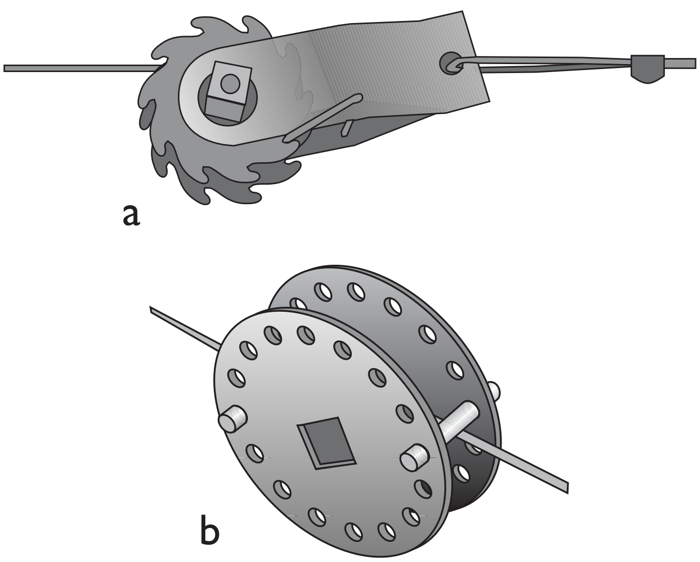

Figure 5a and b. In-line strainers used to tighten and maintain tension are available in two types: a) the ratchet strainer; and (b) the "daisy" strainer. The ratchet strainer requires a special handle for tightening. A 1/2-inch drive ratchet can be used to adjust the "daisy" strainer.

Tension indicator springs (Figure 6) are used to set and maintain the correct wire tension. Use one tension spring on one wire per fence and set it to the proper tension. The other wires can be tightened to the same tension by feel or sound (similar to tuning a guitar). The tension spring is generally set on the second wire. However, placing the tension spring on the top wire provides some additional "give" to minimize damage caused by falling tree limbs.

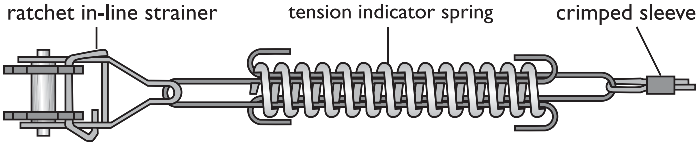

Figure 6. Tension indicator spring used to set and maintain proper high tensile wire tension.

Electric Fences

Electric fences are a safe and effective means of providing permanent and temporary fencing for most livestock. Their purpose is to supply sufficient electrical shock to any animal, whether livestock or predator, that comes in contact with the wire. Livestock that are unfamiliar with electric fences must be trained to respect and stay away from the electric wire.

Temporary Fences

Temporary electric fences can be constructed from numerous products. One of the more popular products consists of fine aluminum or stainless steel wires woven together with polyethylene fibers to form what is known as poly tape. This product comes in various colors with black being the most difficult for animals and humans to see. Brighter colors such as white or orange are much easier to notice and are recommended where visibility is especially important. Poly tape is also available in various wire densities. The maximum length for poly tape with a low wire density is about 1200 feet. Poly tape with a high wire density can be used for longer runs.

Permanent Fences

Permanent electric fences generally consist of two or more strands of smooth wire. However, fences designed for small predator control may have as many as ten or twelve strands. Alternate wires are "hot." Other wires serve as grounded returns to the controller. The ground wire return design is recommended where the soil may be dry some of the time.

Permanent electric fences can be built from aluminum, stainless steel, and high tensile wire. These types of wire conduct electrical charges for longer distances than poly tape. However, they are more difficult for animals to see. Animals will not be effectively trained to avoid electric wire unless they can see the wire as they feel the shock. Attaching strips of brightly colored cloth or plastic to the wire creates contrast and movement for easier visibility.

Controllers

A controller, also called a charger or energizer, regulates the flow of energy in fence wire by supplying pulses of high voltage electricity in short duration. An animal that comes in contact with energized fence wire completes the circuit from the fence wire through its body, and then through the ground to the ground rod. The discomfort of the shock discourages the animal from further contact with the fence.

In Virginia, it is unlawful for any electric fence to be energized unless a controlling device regulates the charge on the fence wire. The controller must meet the safety standards of either the Underwriter's Laboratories, Inc. (UL) or the International Commission for Conformity Certification of Electrical Equipment (ICCC). **Do not use homemade or inexpensive, high impedance controllers.** They may cause serious injury or death to both humans and livestock. Furthermore, the use of poorly designed controllers may result in grass fires around the fence. Consult Section 55-298.2 of the Code of Virginia for precise specifications for lawful electric fences.

Fencing Materials and Equipment

Fence posts

Many types of fence posts are available including wood, steel, and fiber glass posts (Table 1). Fence post selection should be based on your specific fencing need. For example, treated wood posts are best for permanent boundary fences while steel or fiber glass posts are suitable for temporary paddock fences. Fence posts must be long enough to accommodate fence height, depth of setting, and an additional 6 inches. Recommended post spacings for various fences are in Table 2.

Table 1. Fence post characteristics.

Post Type	Bending Strength	Expected Life (yrs)	Maintenance
Wood			
treated	good	10 – 30	very low
untreated	good	2 – 25	high
Steel			
"T"	fair	25 – 30	low
3/8-inch rod	poor	15 – 20	medium
Fiberglass			
heavy-duty "T"	fair[1]	25 – 30	low
light-duty "T"	poor[1]	15 – 20	medium

[1]Fiberglass posts are moderately flexible.

Table 2. Recommended post spacings for various fence types.[1]

Fence	Spacing (feet)
Woven wire	14 - 16
Barbed wire (standard)	12 - 20
Barbed wire (suspension)	80 - 120
Temporary electric	20 - 40
Permanent electric	20 - 90
High tensile	16 - 90
Board[2]	7 - 8
Corrals	6

[1]Post spacing are approximate and need to be adjusted for topography, livestock pressure, post size, wire tension, and use of poly spacers, battens, or droppers (electric fence).
[2]Allowances must be made relative to board length and straightness of driven posts.

Table 3. Life expectancy (in years) of treated and untreated wooden posts.

Species	Untreated	Treated
Black locust	20 – 25	N/A
Hickory	5 – 7	15 – 20
Honeylocust	3 – 7	10 – 20
Osage orange	20 – 25	N/A
Red cedar	15 – 20	20 – 25
Red oak	5	15
Southern pine	3 – 7	25 – 30
Sweetgum	3 – 6	20 – 30
White oak	10	15 – 20
Yellow-poplar (Tulip tree)	3 – 7	20 – 25

Wood

Wood posts are commonly used and can be less expensive than other materials if cut from the farm woodlot or if untreated posts are purchased. Post durability varies with species (Table 3). For example, osage orange and black locust posts have a lifespan of 20 to 25 years whereas southern pine and yellow-poplar rot in a few years if untreated.

Wood posts are highly variable in size and shape. Strength of wood posts increases with top diameter. Post strength is especially important for corner and gate posts, which should have a top diameter of at least 8 inches. Brace posts should be 5 inches or more in top diameter. Line posts can be as small as 2 1/2-inches in top diameter, although larger diameter posts make fences stronger and more durable.

Flat-sided posts should be used for board fencing; the flat side provides a good surface for board attachment. There are three types of flat-sided posts: faced, square, and half-round posts (Figure 7). Faced posts are the strongest followed by square posts. Half-round posts are made by sawing through the center of the heartwood. These posts are inexpensive, but inferior in strength to faced and square posts.

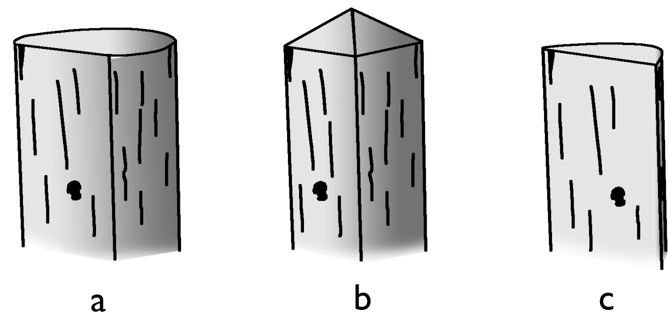

Figure 7. Types of flat-sided wood posts for board fences: a) faced; b) square; and c) half-round posts.

Steel

Steel posts weigh less and are easier to drive into the ground than wood posts. Steel posts also ground the fence against lightning when the soil is wet. One main disadvantage of using steel posts is that they are likely to be bent or forced out of line by livestock. Using wood posts every 50 to 75 feet can help keep steel posts from bending and improve the strength of the fence.

Electric Fence Posts

Various kinds of posts are available for electric fences including fiber glass, plastic, steel, or low-conductivity wood. Wood and steel posts require insulators to prevent short-circuiting of the fence through the posts. Plastic step-in posts work well for temporary fencing, but should be treated with ultraviolet inhibitors (UV treatment) to minimize deterioration in sunlight.

Wire

Steel wire longevity depends on the type and thickness of protective coating around the wire. Zinc is commonly used to cover (galvanize) steel wire to protect it from rusting. There are several ways of applying zinc to steel wire and some are claimed to be superior to others. However, results of the American Society of Testing and Materials (ASTM) show no practical difference among galvanization methods.

Zinc coatings are measured in ounces of zinc per square foot of wire surface. The more zinc per square foot, the more years of wire use before rusting starts. The ASTM has established "classes" of zinc coatings for steel wire based on the number of years that galvanizing delays wire rusting under different climatic conditions (Table 4). Class 1 has the lightest zinc coating and Class 3 has the heaviest. Machinery, livestock, and fire may damage the zinc coating which results in wire that rusts sooner than undamaged wire.

Table 4. Approximate protection given steel wire by Class 1 and Class 3 galvanizing.

	Climatic Condition					
Wire Size	Dry		Humid		Coastal and Industrial	
	Class					
	1	3	1	3	1	3
9	15	30	8	13	3	6
11	11	30	6	13	2	6
12 1/2	11	30	6	13	2	6
14 1/2	7	23	5	10	1 1/2	4 1/2

Steel wire may have less than a Class 1 coating. This is often referred to as "regular" galvanizing. Many local dealers stock steel wire with either regular or Class 1 coatings. Wire with a Class 3 coating may have to be special ordered from the manufacturer.

Steel wire will completely rust within one to three years once rust appears. Wire size is most critical at this point since rusting slowly reduces the diameter of the wire and subsequent wire strength. Small wires are at a disadvantage since the surface area per unit weight of wire is much greater than for larger wires.

Staples

Staples are used to fasten fence wire to wood posts. Selecting the appropriate staple is important to the overall strength and longevity of the fence. Staple withdrawal is a common fencing problem when using pressure-treated softwood posts. The lubricating action of the wood preservative, combined with the soft nature of the wood, causes staples to loosen and fall out of the post. To avoid staple withdrawal, use 1 1/2-inch or 2-inch long, 8- or 9-gauge, hot-dipped, galvanized staples with cut points and barbs. Shorter staples can be used with untreated hardwood posts. Do not select "bright" staples as they will rust immediately. Aluminum staples should not be used since they bend while being driven into posts.

Nails and Screws

All fasteners should be galvanized with a Class 3 coating to minimize rusting. Nails with grooved shanks are less likely to withdraw from fence posts. Sixteen penny nails work well for fastening. Galvanized screws are another option for fastening boards to fence posts.

Material and Fence Costs

Fencing material costs are highly variable depending upon material types, post spacings, size and terrain of pastures and associated paddocks, and the use of permanent versus portable or temporary fencing. Labor costs also vary depending upon fencing type and pasture terrain. General fencing costs are discussed in this section.

Labor Estimates

Labor requirements vary with specific farm conditions. Table 5 is a guideline for estimating labor to construct permanent fences on the farm. Multiply these estimates by the labor wage rate to approximate labor costs for building or installing a given length of fence. Labor costs are minimal for temporary or portable fencing. Therefore, these costs are often incorporated into management functions or assigned to the cost of checking animals or animal husbandry. Copies of the "Farm Custom Work Rates Guide" are available from your local Extension agent.

Table 5. Estimated labor requirements for permanent fence construction.

Item	Labor Requirement
Line posts	
Hand tamp	20 min/post
Machine driven	6 min/post
Brace posts	
Machine driven	8 min/post
Brace assemblies (construction)	
Single span	45 min/unit
Double span	1.25 hrs/unit
Spacers or battens	2 min/spacer
Woven wire	
Unwind and stretch	1/2 min/ft
Fasten	6 min/post
Barbed wire (per wire)	
Unwind and stretch	1/5 min/ft
Fasten	1 min/post
High tensile wire (per wire)	
Unwind	1/100 min/ft
Stretch	10 min/stretch point
Fasten	1 min/post (2 min/post for electric fence)
Electric fence controller	2 hrs/unit

Material Cost Estimates

Table 6 is a summary of relative costs for common fencing materials. Check with local fence suppliers to determine actual material costs.

Livestock Considerations

Special fencing requirements for various livestock types are discussed in this section. The most important criterion to consider during the fence selection process is that of the fence's effectiveness to contain livestock. This ability can be diminished if neighbors own the same livestock species or if extremely palatable forages are available on the other side of the fence. Woven wire fence with an electrified wire has been used successfully in this case. The strand of electrified wire should be placed at 2/3 of the height of the animals to be controlled. Selecting a stronger fencing type is also recommended for animal control when stocking rates and grazing pressure are high.

Cattle

Barbed and woven wire fences have traditionally been used for cattle. Four- or 5-strand barbed wire fences are adequate for cattle. The initial cost of materials for barbed wire fences is about

Table 6. Approximate material costs for fencing materials.

Permanent Fence			Cost Index[1] (Materials Only)	Expected Life[2] (yrs)	Maintenance
Barbed wire (2- or 4-point)					
Standard fence					
3 strands, 12 1/2 ga.			12	33	high
4 strands, 12 1/2 ga.			13	33	high
5 strands, 12 1/2 ga.			14	33	high
3 strands, 14 ga.			11	19	high
Suspension fence					
4 strands, 12 1/2 ga.			8	33	medium
6 strands, 12 1/2 ga.			10	33	medium
Woven wire	Stay height	Spacing			
Light weight	(in)	(in)			
	26	6	14	19	high
	32	6	15	19	high
Medium weight					
	26	6	16	30	medium
	32	6	17	30	medium
	39	6	18	30	medium
	47	6	20	30	medium
Heavy weight					
	26	6	19	40	low
	32	6	21	40	low
	39	6	23	40	low
	47	6	25	40	low
High tensile					
3 strands, 12 1/2-gauge			4	30	medium
4 strands, 12 1/2-gauge			5	30	medium
5 strands, 12 1/2-gauge			6	30	medium
8 strands, 12 1/2-gauge			10	30	medium
Temporary Fence					
Barbed wire (2- or 4-point)					
1 strand, 12 1/2 gauge			4	30	medium
2 strands, 12 1/2 gauge			5	30	medium
Aluminum wire					
1 strand, 9-gauge			6	30	medium
1 strand, 13-gauge			5	30	medium
Poly wire (stainless steel wires)					
1 strand, 6 wire			2	5	medium
2 strand, 6 wire			4	5	medium
1 strand, 9 wire			3	5	medium
2 strand, 9 wire			5	5	medium
Poly ribbon (7/8-inch)					
1 ribbon, 6 wire			3	3	medium
2 ribbon, 6 wire			6	3	medium

[1]Cost index figures are to show relative cost, not actual cost. For example, fence with a cost index of 25 costs about twice as much per foot as fence with an index of 12.

[2]Fence life based on a combination of post and wire life expectancy in a humid climate.

70 percent of that for woven wire fences of 1047-12-11 design. However, barbed wire fences require higher maintenance and have shorter lifespans than woven wire fences.

Heavy and extra heavyweight woven wire fences with one or more strands of barbed wire above the fence are excellent for cattle. Fence height should be at least 39 inches. The initial cost of woven wire fence is about 130 to 175 percent of the cost of a 5-strand barbed wire fence. However, woven wire fences require less maintenance and last longer that barbed wire fences.

High tensile electric fencing with four or more strands of wire also makes excellent cattle fence. Fence height for perimeter fences should be a minimum of 54 inches. The cost of a 4-strand high tensile electric fence is about 50 percent of the cost of a 4-strand barbed wire fence and 30 percent of the cost of a 1047-11-12 woven wire fence. A moderate amount of maintenance is necessary for high tensile electric fences.

Wood or heavy wire panel fences are highly recommended for cattle handling facilities. Fence height should be at least 60 inches to prevent escape. Fences should also be clearly visible to reduce stress on the animal and to enhance movement through the facilities.

Sheep and Goats

Barbed wire fences have typically been used for sheep and goats. However, these fences are not recommended for sheep since barbs pull the fleece. Furthermore, barbed wire fences do not effectively confine goats if moderate grazing pressure is applied to the fenced-in area.

Heavy or extra heavyweight woven wire fences are excellent for non-horned sheep and goats. Fence height should be at least 39 inches high to prevent animals from climbing over the fence. However, fence height depends upon the breed to be confined. Mesh wire fences also make excellent fences for non-horned sheep and goats. Temporary fencing is not recommended for sheep or goats since they can easily escape

Special consideration must be given to fencing for horned sheep and goats. Fencing should prevent horned sheep and goats from placing their heads on the other side of the fence or should have openings that are large enough to let animals slide their head through the fence and back. Permanent electric fences also make good fences for horned goats and sheep.

Predator control is another important consideration for sheep and goat fencing. Five-strand high tensile electric fence is particularly useful for discouraging predators such as dogs and coyotes. However, fences must be kept free of vegetation to maintain electric current on the fence.

Woven wire fencing is excellent for predator control. One strand of high tensile electric wire can be used at the bottom of a woven wire fence for predator control. If electric wire is not used, the fence bottom should be placed on the ground to allow for the use of snares where predators dig under the fence. At least one manufacturer makes woven wire fencing with stay wires attached to line wires with a fixed knot. This prevents predators from sliding apart the stay wires and entering the confined area.

Coyotes can pass through openings as small as 4 1/2 inches. Woven wire fences with stay wires spaced close together can prevent predators from entering fenced-in areas. Some manufacturers produce fencing with bottom openings of 6 inch by 3 inch for predator control and 3 inch by 3 inch for predator proofing.

Swine

Barbed (standard and suspension) wire and cable fences are not effective for swine confinement. Woven wire fences with one or more strands of barbed wire (placed along the ground to discourage rooting) provide good hog control. Medium and heavyweight woven wire fences with small openings are excellent for restraining swine. Maximum fence height should be 54 inches. Fences built close to the ground prevent hogs from escaping by rooting underneath the fence.

Horses

Visibility is the most important characteristic of horse fencing. Poorly visible fences such as high tensile and barbed wire fences should not be used with horses; the animals may incur severe injuries (e.g. deep lacerations and broken bones) if they become entangled in fence wires. Woven wire fence with openings of 4 inches or more should not be used since legs may become trapped in the openings.

Woven wire fencing with openings less than 4 inches are suitable for horses if a single 1 inch by 6 inch board is placed at the top of the fence to increase visibility. Diamond-mesh wire of 12?-gauge minimum makes good horse fencing. Electric fencing is also an option since it will discourage contact and decrease the incidence of fencing-related injuries. For more information on fencing systems for horses, see “Horse Fencing 101.”

Conclusions

Producers have numerous fencing options for the confinement and protection of livestock. Many traditional materials such as barbed and woven wire fences are suitable for fencing. However, newer materials including high tensile wire should also be considered prior to selecting fencing type. Fencing type should be selected for maximum effectiveness of your fencing need. Fencing materials should provide the longest life and lowest maintenance to optimize the fencing system for livestock confinement and protection. Routine inspection and maintenance will be helpful in giving long and trouble-free service.

Acknowledgments

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For Additional Information:

On Fence Construction

NRAES-11 "High Tensile Wire Fencing" ($4.00)

To order NRAES publications, contact your local Virginia Cooperative Extension office.

On Fencing For Horses

"Horse Fencing 101" available through the Augusta County Cooperative Extension.

On Planning Fences

VCE Publication 442-130 "Planning Fencing Systems for Controlled Grazing"

On Predator Damage to Livestock

VCE Publication 410-030 "Addressing the Consequences of Predator Damage to Livestock and Poultry"

Publication Modified from:

Turner, J. H. 1997. Planning Fences. American Association for Vocational Instructional Materials (AAVIM): Winterville, GA.

Bushermohle, M. J., J. B. Wills, W. W. Gill, and C. D. Lane. 1996. Planning & Building Fences on the Farm, University of Tennessee Agricultural Extension Service PB 1541.

Worley, J. W. 2000. Fences for the Farm. Circular 774, The University of Georgia Cooperative Extension Service, Athens, GA.