



# Designing a Permanent Grazing Infrastructure

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## Introduction

It is a common misconception that managed grazing requires the use of temporary electric fencing, but this is not necessarily the case. Temporary electric fencing is especially useful for farms with limited capital, for limited-grazing (strip-grazing) pastures, or when experimenting with fence locations before building permanent fencing; however, it is not necessary for implementing managed grazing. Using permanent infrastructure as much as possible can dramatically reduce the labor requirements of managed rotational grazing. In many cases, financial assistance may be available through the Natural Resources Conservation Service (NRCS) or Virginia Soil and Water Conservation Districts (SWCD) to install fencing and watering systems in support of rotational grazing.

A well-planned grazing system can significantly reduce labor requirements and make livestock handling easier and safer. Whether a producer is building a new grazing system or modifying an existing one, it is a good idea to begin by obtaining an aerial map to experiment with various designs on paper. With the map in hand, walk or ride the property and note the location of relevant terrain features, existing fences and watering points, and any preferred travel routes used by livestock. This publication, one of four in a series on rotational grazing, provides recommendations to incorporate into the system as a design takes shape.

## Start with a dependable perimeter fence

Install a strong, permanent perimeter fence, typically made of woven wire or multiple-wire high-tensile electric. While permanent fencing is relatively expensive, a good perimeter fence is the backbone of any grazing system and brings peace of mind by ensuring that livestock remain on the property at all times. For farms with small ruminants, using a woven

wire perimeter fence with close wire spacing serves double duty as a first line of defense against predators.



Figure 1. Woven wire perimeter fence with an offset electric wire. (Photo credit: Matt Booher.)

## Extend electricity to all parts of the farm

An electrified perimeter fence or a nonelectric perimeter fence with an electric offset wire (fig. 1) serves to carry electricity around the entire farm, which creates many options for using temporary electric fencing if desired. In some cases, a “trunk line” may be necessary to extend electricity to internal paddocks that are not close to the perimeter fence. Whether an electric offset or trunk line is used, use 12 ½ high-tensile wire with a Class 3 galvanized coating to ensure maximum current is supplied over long distances. Use insulated lead-out cable when installing a trunk line that passes near buildings, waterers, or other hazards to avoid electrical shorts and/or stray voltage.

## Use high-tensile electric fencing to divide pastures

High-tensile electric fencing (fig. 2) is a relatively inexpensive way to permanently divide pastures into smaller paddocks and also serves as a way to carry electricity throughout the farm. This type of fencing can be successfully built using wooden or fiberglass posts,

plus traditional wooden braces or alternative braces (fig. 3). Metal posts are not the best choice for use with electric fencing due to a high risk of electrical shorts or reduced voltage from damaged insulators or outright induction of current onto posts. Barbed wire is an additional option, but it should not be electrified. Farmers who are unfamiliar with the property they are fencing will sometimes experiment for a year with semi-permanent or even temporary electric fencing (e.g., step-in posts and poly wire) to determine the best location for interior fences.



Figure 2. Examples of interior cross fencing: A two-wire, high-tensile electric fence with wooden posts (2a); and a four-wire, high-tensile electric fence with fiberglass posts (2b). (Photo credits: Bobby Clark, Virginia Cooperative Extension [2a], Matt Booher [2b].)

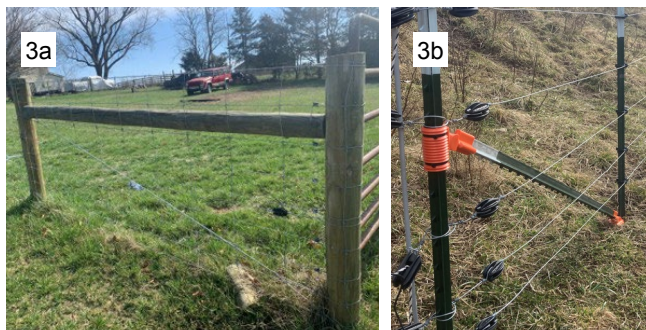


Figure 3. High-tensile electric fence can be built with standard 8- to 10-foot-long H-braces (3a) or alternative braces such as the LocJawz T-post brace (3b). (Photo credits: Matt Booher [3a], Gabe Pent, Virginia Cooperative Extension [3b].)

Typically, one to three electric wires provide adequate interior fencing for cattle, while small ruminants may require four or more. Wire height and spacing are important when installing a multiple-wire fence. The primary goal is to position the wires so that livestock receive a shock to the face. Additionally, the lowest wire should be low enough to prevent animals from going underneath. Spacing wires more than 10 inches apart may allow animals to put their heads through the fence, shocking them on the chest or back of the

neck and causing them to go through the fence. For more information on proper wire spacing, see Virginia Cooperative Extension publication SPES-688P, “Electric Fencing: How Does an Electric Fence Work?” (<https://bit.ly/electricfence>).

Fences with electric wires within about 12-18 inches of the ground can become shorted out when grass grows tall, and this may result in below-adequate voltage. To help, use a split-bolt connector or install cut-out switches when connecting the bottom and top wire(s). During springtime, the bottom wire(s) can be disconnected or cut off to maintain proper fence voltage. Alternatively, some herbicides are labeled for “chemical mowing” and can be sprayed under the fence line soon after spring green-up to suppress grass growth. Grasses will continue growing vegetatively throughout the spring period, but they will not grow tall and stemmy. Plateau (imazapic) herbicide (2 oz. per acre) is labeled for chemical mowing, as is Chaparral herbicide (2 oz. per acre).

## Create a minimum of six to eight permanent paddocks per animal group

Maximizing the amount of permanent infrastructure to enable at least a low level of grazing management intensity will greatly minimize the labor required to rotate livestock. Creating at least six to eight permanent paddocks per animal group will enable livestock to be moved to new pasture in a timely manner while ensuring that paddocks receive appropriate rest. The number of paddocks needed to achieve the full benefits of rotational grazing must be applied to each separate animal group on the farm. For example, a farm with both a spring and fall cow herd would need a minimum of 12-16 total paddocks to provide appropriate rest to all paddocks for both herds. Paddocks may be sized differently for groups that differ in size, but the acres and number of paddocks dedicated to each group should reflect an appropriate stocking rate and enable proper rest of the pasture.

## Plan for a sacrifice pasture

It is wise to think about adding a sacrifice pasture or paddock into the grazing system. A sacrifice pasture is used to rest other paddocks during drought, keep livestock off wet fields that may be prone to pugging and compaction, or to hold livestock when they cannot be in the regular grazing rotation for any reason. Consequently, sacrifice pastures are ideally located at high and dry spots (fig. 4).





Figure 4. Sacrifice pasture in use during summer drought. (Photo credit: Matt Booher.)

Sacrifice pastures are designed to be abused to maintain the health of the core paddocks in the grazing system. As such, they often shift to less desirable forage species that can better handle abuse (such as tall fescue or bermudagrass), and this is OK. Sacrifice pastures are commonly overseeded on an annual basis to help reduce weed competition and keep the soil covered.

## Use central watering areas

Considerations for how many paddocks to create and where to locate them should be made keeping in mind the need to supply water to each paddock. Ideally, beef cattle should be no further than 1,000 feet from a water source; otherwise, outlying areas of the pasture tend to get underutilized (Roberts and Gerrish 1999). Lactating animals or small ruminants may need to be even closer. A central watering corral (fig. 5) gives selective access to multiple fields while allowing livestock to approach the trough from all sides. Additionally, watering corrals can double as catch pens, and some farmers have even incorporated a loading pen.

Waterers placed in the corner of a field or in fence lines are common but provide limited access when livestock water as a group. Dominant animals will often drink their fill and then draw the flock or herd away before less dominant animals have adequately hydrated.

A water block (fig. 6) can be constructed between two fields in place of a traditional fence line waterer to prevent livestock access to the adjacent field while enabling livestock access to the trough from all sides.



Figure 5. Aerial image of a watering corral showing accessibility from four paddocks (5a), close-up of a watering corral with a six-hole waterer and a 16-square-foot concrete pad (5b), and a watering corral with attached loading pen (5c). (Photo credits: Google Earth [5a], Matt Booher [5b], Alan Hawkins, Natural Resources Conservation Service [5c]).

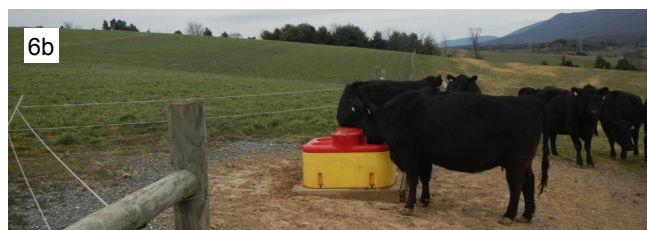


Figure 6. A fenceline water block (6a); a close-up of the fenceline water block using temporary fencing to block access to adjacent pasture (6b); and a water block using movable gates and PVC pipe sleeves set in concrete, allowing posts and gates to be installed or removed to control access (6c). (Photo credits: Matt Booher [6a], Mike Phillips, Rockingham County, Virginia [6b], Cory Williams, Natural Resources Conservation Service [6c].)



## Incorporate lanes to connect paddocks and critical infrastructure

Incorporate lanes to connect paddocks and critical infrastructure, such as catch pens, working facilities, or sacrifice pasture, thereby reducing the labor and hassle associated with moving livestock (figs. 7a and 7b). Both narrow (e.g., 10 feet wide) lanes hardened with stone and wide (e.g., 40 feet wide) grass-covered lanes can be used. A wide lane (fig. 7c) can often be managed as a short-duration paddock to help keep it grazed down or to hold livestock for a day or two before working them. Highly visible electric poly tape/ribbon can be used effectively at critical points in lieu of or in addition to gates to control livestock movement within the lane.

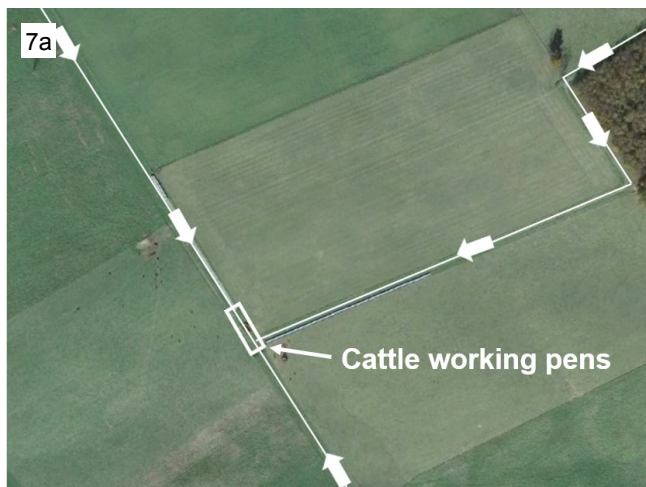


Figure 7. Lanes (white lines in fig. 7a) have been used on the farm in these photographs to provide direct access from a dozen paddocks to a central working area (7b). The lanes are each 40- to 50-foot wide (7c), which makes them wide enough for equipment and large enough to be managed as a short-duration paddock to keep the grass grazed or to hold livestock for a day or two before working them. (Photo credits: GoogleEarth [7a], Matt Booher [7b], David Fiske, Virginia Cooperative Extension [7c].)

## Consider animal behavior and movement

Regardless of what fencing type is chosen for the perimeter and interior fences, incorporate curves and minimize corners as much as possible to improve animal flow and movement (fig. 8).



Figure 8. An interior fence utilizes a curve to encourage animal flow to the corner gate. (Photo credit: Matt Booher.)

Locate gates in corners rather than in the middle of fences, and consider placing gates on both sides of a paddock to add flexibility when moving livestock. When hanging gates, consider how hinge placement on the post might help or hinder the movement of livestock. For example, placing hinges directly in line with the fence causes the gate to bind on the post and prevents the gate from opening fully. This can create a potential trap, making it difficult to move livestock to the opening. Conversely, placing hinges at a slightly offset angle on the anchor post allows the gate to be opened completely to rest against the fence (fig. 9).



Figure 9. Mounting gate hinges at a slightly offset angle on the anchor post (9a) allows the gates to be opened fully (9b). (Photo credit: Matt Booher.)

Animals prefer to follow the terrain, so observe any established travel routes where livestock naturally cross wet areas or walk up hills, then locate any needed gates or crossings in those spots. Keep in mind that livestock generally graze or travel at angles going uphill, so locate fences and shape paddocks to match the terrain as much as possible in these instances.

## References

Roberts, C., and J. Gerrish. 1999. *Missouri Grazing Manual*. Columbia, MO, USA: MU Extension, University of Missouri–Columbia. pg. 83.

## Technical resources and cost-share information

### Soil and Water Conservation Districts (SWCD)

Soil and Water Conservation Districts throughout Virginia offer grazing management technical support and state-funded cost-sharing to install grazing management infrastructure such as interior fencing, waterers, stream exclusion fencing, and other agronomic practices. Find a list of local offices from the Virginia Department of Conservation and Recreation at “Virginia’s SWCDs by Locality,” <https://www.dcr.virginia.gov/soil-and-water/swcdlist>.

### Natural Resources Conservation Service (NRCS)

Offices throughout Virginia offer grazing management technical support and federally funded cost-sharing to install grazing management infrastructure such as interior fencing, waterers, stream exclusion fencing, and other agronomic practices. Find a list of U.S. Department of Agriculture Service Centers and associated NRCS offices at “Find Your Local Service Center,” <https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/virginia#contact>.

## Virginia Cooperative Extension (VCE)

The Virginia Cooperative Extension’s Graze 300 website (<https://ext.vt.edu/agriculture/graze-300.html>) offers information on grazing livestock for 300 days by using better pasture management and environmental stewardship. Extension offices in each county in Virginia offer education and resources from Virginia Tech and Virginia State University, as well as the entire Extension system. Find a list of Virginia’s local offices and regional centers at “Local Offices,” <https://ext.vt.edu/offices.html>.

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