Paddock Design, Fencing, and Water Systems for Controlled Grazing

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Interest in controlled grazing is increasing throughout the U.S. Controlled grazing systems are economically feasible and more easily managed because of developments in fencing and water technology. This publication covers some of the basics of paddock design and current fencing and water technology. Paddock design needs to be based on landscape, land productivity, water availability, and the number and types of animals in the system. Water systems are more complex and expensive than fencing systems. Producers need to understand all the technology available before going to the expense of establishing a grazing system. A good way to explore the technology is by ordering catalogs from companies that sell fencing and/or water systems.

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The paddock to the left was just grazed.
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This publication is an introduction to designing a grazing system. The enclosures, while many, are written by some of the top authorities in the country and offer more specific information.

Starting a grazing program can be fairly simple. Producers are usually better off "growing" into a program than jumping in and subdividing their farms into paddocks. Simply dividing existing pastures in half, closing some pasture gates, or stringing temporary fencing can be a beginning to controlled grazing. Watching livestock graze, learning to monitor pastures, and using temporary fencing for subdivisions all advance the system without the producer having to take large risks.

Some producers will use temporary fencing to help them grow into a grazing system, and then put in high-tensile wire after they see where they would like to have it and how frequently they want to rotate. Some equipment and experience are also necessary when working with high-tensile wire. For example, a spinning jenny is a must in unrolling the wire, while a crimping tool is necessary when using the lower gauge (thicker) wire, which should be used if deer are a problem. (Deer

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will not break the lower gauge wire but might the higher gauge.) Some people who work with graziers to establish controlled grazing systems like to develop water lines first and then do the fencing. The first considerations, however, are paddock numbers, size, and shape. Paddock size is determined by the number of animals and the frequency of rotation, and these are influenced by how much forage is needed by the type of animal being grazed. For example, some cow-calf operations are never stocked heavily enough to justify a daily rotation, because their animals do not have high enough nutrition requirements to justify that much "control." The following ATTRA publications will help you make some of these decisions and should be read before this one.

- *Rotational Grazing*
- *Matching Livestock and Forage Resources in Controlled Grazing*
- *Meeting Nutritional Needs of Ruminants on Pasture*

Forage availability

The next step is to calculate the forage needs of the animals and how much land is needed for the periodic rotations. These calculations are described in detail in the enclosures. The Iowa State material (1) includes some work sheets that might be useful. Generally, having a stock density of 30,000 to 50,000 pounds of animals per acre per day works well. This is based on how much forage is available, how much the animals will eat in one day, and how much residual is left in the pasture. If a person is rotating every three days, then that is 10,000 to 17,000 pounds of animals per acre for that period. If these are high-producing (milk) animals, then the lower figure is used. If forage is abundant, then the higher figure is used.

Here's an example of some cow-hand arithmetic: thirty average beef animals would need about an acre a day. If the animals were rotated twice a week, paddocks should be three to four acres. If on average a paddock is ready to be regrazed after 30 days of rest, one would need 11 paddocks (remember you cannot rest a paddock and graze it at the same time). Rest for 30 days plus grazing for 3 days divided by a 3-day rotation gives 11 paddocks.

Paddock design

Most people think of paddocks as flat, symmetrical squares. Unfortunately, most farms are not flat. They have hills, streams, and often woods. A general recommendation is to allow cattle access to water within 800 feet from any point on the pasture. Research has shown that if cattle have to walk more than this distance to water, they tend to undergraze farther from the water source.

Cattle also tend to go to water together when a lane is used or when they are far away from the water, which can be important in determining the type of water system to use. The distance-to-water figure, however, can depend on terrain, type of cattle, forage availability, and grazing goals of the producer. The 800-feet figure is probably best used in a system designed for maximum forage use.

However, landscape should be considered. Livestock may prefer to graze some slopes or flat areas to others. If a paddock has a lot of variation in it, it may be poorly used, because some areas are will be overgrazed and others undergrazed. In this case, it is best to fence according to the landscape or use temporary fencing to control access within the paddock.

In designing a grazing system, also consider differences in productivity of the land. For example, in a two-day rotation, some paddocks may need to be larger than others to have the same amount of forage available.

Fencing

The first step in fencing is to choose a low-impedance, high-voltage charger. There are several excellent ones on the market that include solar, battery, or household hook-up. Quality varies considerably. Information on chargers is enclosed. Proper grounding of the system is absolutely essential to its success. This can be a particular problem in rocky or very dry soils.

Use catalogs to compare prices and get an idea of the products and techniques available in fencing and water systems. Several companies have toll-free numbers and will send you catalogs for free. A list of the major suppliers is enclosed. If you call for a catalog, ask about dealers or company representatives in your area. These people can sometimes give you a better deal than the company itself and may provide some practical consultation. Be aware that some custom fencing companies may overbuild fences (use more wires than necessary).

As indicated earlier, technological advances in these areas now allow a producer to do a better job of grazing management by having greater control over the use and growth of pastures. Advances in water systems, such as solar pumps and other devices, enable producers to have enough paddocks to rotate cattle frequently and also have water available in each paddock.

Wire

Though there are many kinds available, high-tensile wire offers the most permanent option. In the presence of good perimeter fences and cattle that are trained to respect an electric fence, one strand of wire works very effectively for interior fences and paddock dividers. The wire should be strung at about shoulder-level of the animals. By having the wire high enough, calves can "creep" into the next pasture and graze more abundant forage. Having two pinlock insulators on a post and moving the fence to the higher one as calves begin to creep graze is an easy way of managing the system. (Note: If using wood posts, put the pinlock insulator on with staples and not the nails sometimes sold along with them.) Other producers feel that having one wire allows calves to get used to being shocked and makes them harder to handle as yearlings and adults. The greatest advantage of one wire for cattle is that they will eat underneath it, whereas with more than one wire, grass grows up underneath. Three wires will normally control sheep and goats, if they are trained to it.

For a more portable system you may use polywire and polytape. Polytape is more visible, but the wind blows it and loosens the step-in posts, particularly when the ground is wet. A cost-saver that some producers use is to put the wire on electric cord reels. These cost about $5 at hardware stores. Some producers use high-tensile as a feeder wire and polywire to divide pastures into smaller areas as needed. This system is designed to have the maximum distance fenced in a temporary paddock be equivalent to the length of the polywire on the reels. Some producers say that ice on polywire during the winter can be a problem (one person made the mistake of trying to knock it off and broke the wire filaments). Again, it is important to try out several of these options to determine what you like best. Pasture walks (farm visits) are a good way to find out what other producers are using. Contact your local Extension or NRCS office to see whether there are producers in your area whom you could visit.

An example of electric fencing using metal T-post.
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Water systems

A lot of producers now are using gravity flow or solar pump systems, with plastic pipe laid on top of the ground. This works well when it is above freezing. Pipe made of burst-proof plastic stays intact during the winter without draining. Couplers installed in the pipe at certain intervals and portable "tanks" can be used to water the livestock. Small containers, such as half of a 55-gallon drum, can water up to 150 head of cattle and have worked well for some producers. Make sure that water is being replenished as fast as it is being consumed. Otherwise the cattle will tear up the system. This usually requires a float valve that allows 5 to 8 gallons of water a minute into the container and the use of a pipe larger than 1-1/4" in diameter. One producer has watered 300 steers from a 50-gallon portable tank hooked to a 2-inch feeder line. The con-

Floating pipe and electric fencing limit livestock access to the pond. ©A. E. Beetz 2005

nection used a quick-coupling device and a garden hose. The tank was equipped with a rapid flow valve. It was also situated so that the cattle would drink individually throughout the day, rather than the entire herd at once. This ensured that there was always water available.

Some of these devices are a little hard to keep clean, so you may want to know the maintenance requirements when using pond or creek water.

Along with the accompanying articles on fencing, water, and paddock layout is a list of product distributors. Call for their catalogs. This will help you evaluate the differences in price, and you will also find the catalogs educational. Most offer shortcuts that you can use and give helpful information on how to install fencing and water systems. A good contact for information on water systems is Kentucky Graziers Supply.(2) Good material on solar water systems is available from the Missouri Department of Conservation (3), if this is a subject that interests you.

Related ATTRA Publications

- *Assessing the Pasture Soil Resource*
- *Grass-based and Seasonal Dairying*
- *Matching Livestock and Forage Resources in Controlled Grazing*
- *Meeting the Nutritional Needs of Ruminants on Pasture*
- *Rotational Grazing*
- *Sustainable Pasture Management*
- *Beef Farm Sustainability Checksheet*
- *Solar-Powered Livestock Watering Systems*
- *Freeze Protection for Solar-Powered Livestock Watering Systems*

References

(1) Pasture Management Guide
for Livestock Producers
Iowa State University
University Extension
Ames, Iowa
515-294-5247
pubdist@exnet.iastate.edu
www.exnet.iastate.edu/Pages/pubs/cr.htm

(2) Kentucky Graziers Supply
1929 Main Street
Paris, KY 40361-1110
800-729-0592

(3) Watering Livestock with Solar
Water Pumping Systems
Missouri Department of Conservation
P.O. Box 180
Jefferson City, MO 65102-0180
573-751-4115

Enclosures

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Notes

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