COMMON TOOLS AND EQUIPMENT FOR ROTATIONAL GRAZING

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Beefing Up Livestock, Poultry and Agroforestry Enterprises for Military Veteran Farmers
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Module Objectives

- Learn about common tools and equipment used in a rotational grazing system
- Understand different approaches to setting up electric fencing and rotating livestock, including permanent vs. temporary fencing
- Identify unique considerations for small ruminants in a rotational grazing system
Electric Fence: An Introduction
Electric Fence: An Introduction

Many producers are intimidated by installing and using electric fence. Once you learn the basic principles, it is quite easy to use and provides increased flexibility and ease in a rotational grazing system.
An electric fence circuit is made on a larger scale. The energizer fence terminal (positive) is connected to the insulated fence wires, and the energizer earth terminal (negative) is connected to galvanized metal stakes driven into the ground. An animal standing on the ground and touching the electrified wires (shown right) will complete the circuit like the closed switch in the diagram above.
A bird sitting on the wire will not receive a shock. It is not touching the ground so the circuit is not completed. A person wearing insulated footwear will only receive a small shock because all the current cannot pass through the insulated soles.
Dry, sandy or pumice soil is a poor conductor of electric current, so it is a good idea to add a ground (negative) wire into the fence. The animal must touch both a hot wire and ground wire to feel an effective shock.
Electric Fence: How it Works
Electric Fence: Video 1

The following videos provide great explanations and demonstrations on how to set up electric fence:

- How electric fencing works: https://www.youtube.com/watch?v=Zk-YqFRxs_Y

- Electric Fencing with Ralph Harris, Part One: https://www.youtube.com/watch?v=_3V2hpFPXHQ (see also parts 2 and 3)
Common Tools & Equipment
Common Tools & Equipment

There are virtually endless varieties of permanent and temporary fencing equipment. This section is intended to provide you with a brief overview of different types of equipment that are commonly used in a rotational grazing system, especially when it comes to temporary fencing.

Each farmer develops his or her own unique preferences regarding which types of equipment, brands, and set-ups work well for his or her farm. It is a good idea to try a few different types or models before making a substantial investment in a specific item, brand, or device.

One of the best ways to determine the combination of fencing equipment that will work best for your farm is to visit other producers' farms or to speak to other farmers who are experienced with temporary fencing.
Safety First!

Constructing and maintaining fencing can be dangerous. Always use caution and keep these safety tips in mind:

- Wear safety glasses & gloves during installation & repair
- Also wear steel toed shoes & ear protection when driving posts
- Ground energizers properly & only connect one to the same fence
- Label electric fences with “Danger — Electric Fence” signs near public areas
- Try not to run fence lines parallel to power lines (stay at least 30’ away)
- Do not affix fencing wires to utility poles
- Do not electrify barbed wire fences
Permanent Fencing

A rotational grazing system usually requires some permanent perimeter fencing. Some farmers have grazed pastures with nothing more than temporary polywire, but this is riskier when it comes to escaping animals and may also make it easier for predators to reach the herd.

There are many different possible combinations of perimeter fencing:

- Barbed wire, with or without offset electrified wire
- Woven wire, with or without offset electrified wire
- Electrified wire, multiple strands

Incorporating some type of electrified wire on your perimeter fencing can make it easier to create a broad range of paddock sizes and shapes because you can attach a temporary polywire anywhere along the electrified perimeter wire.
Permanent Fencing – Barbed Wire

Barbed wire with metal T-posts and an electrified high-tensile wire on top.

Barbed wire with wood posts
Permanent Fencing – Barbed Wire

Common spacing for barbed wire fences
Permanent Fencing – Woven Wire
Permanent Fencing – High Tensile

High tensile wire is one of the most common types of permanent fence for a rotational grazing operation. It can be more affordable than other fencing options and simple to install compared to barbed wire and other types of fence.

Spinning jenny's make running high tensile wire easy while preventing kinks and tangles.
# Permanent Fencing – High Tensile

## Electric Fence Wire Height and Spacing

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<td>5 Wire</td>
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</table>

- **3 Wire**: Cattle, Horses, and large animal fence
- **3 Wire**: Hog fence
- **4 Wire**: Cattle, Horses, and large animal boundary fence
- **5 Wire**: Feedlot, Horse, boundary fence
- **5 Wire**: Predators, Cattle, Deer, Sheep or boundary fence
- **6 Wire**: Predators, Cattle, Deer, Sheep or boundary fence
Permanent Fencing – High Tensile
Permanent Fencing – High Tensile

An animal shocked in front of its eyes will back up. An animal shocked behind its eyes will go forward. Proper wire spacing is more important than fence height.

**PROPER WIRE HEIGHT FOR PORTABLE ELECTRIC FENCES**

<table>
<thead>
<tr>
<th>Animals to be controlled</th>
<th>Height of wire</th>
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<tbody>
<tr>
<td>1. Cattle</td>
<td>32” to 42”</td>
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<tr>
<td>2. Horses</td>
<td>36” to 48”</td>
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<tr>
<td>3. Sheep and goats</td>
<td>18” to 24”</td>
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<td>4. Pigs</td>
<td>12” to 18”</td>
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<tr>
<td>5. Dogs and small pests</td>
<td>8” to 18”</td>
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</tbody>
</table>

Common spacing for electrified wire fences
T-Post Insulators for Hot Wire

Insulators are the devices that allow the fence to be attached to the permanent post while insulating the electric wire to prevent shortages. There are countless types of insulators.
T-Post Insulators for Hot Wire
Permanent Fencing - Corners

A fence is only as strong as its corner posts. Here are some general guidelines regarding the size and durability of corner posts and braces:

There are two types of corner braces:

**Floating diagonal brace:**
- Adequate for up to a 5 wire high tensile fence.
- Requires only 2 wood posts vs. 3 for an H brace.

**H Brace:**
- Adequate for up to an 8 wire high tensile fence.
Permanent Fencing - Corners

Corner wood post should be braced and:

- at least 6” – 7” diameter for 5 or 6 wire high tensile fence
- at least 4” – 5” diameter for 1 or 2 wire high tensile fence
- at least as deep in the ground as the height of the top wire
- with a 5” diameter brace post that is 10’ long for fences 42” tall or taller, or 8’ long for fences under 42” in height
Temporary Fencing

Most rotational grazing systems rely heavily on temporary fencing. Although you may be tempted to install permanent paddocks, this can lead to detrimental limitations. Having the ability to adjust paddock sizes throughout the year allows a producer to accommodate for fluctuations in:

- Overall herd size
- Dividing the herd based on animal groups
- Accommodating unique nutritional needs of specific groups, i.e., lactating cows vs. dry cows vs. finishing steers
- Pasture health and forage growth
- Weather, i.e., drought or flood

If you choose to create permanent paddocks with permanent fencing, it is highly recommended that you first set up your intended design with temporary fencing to ensure that it will meet your needs and expectations. Although your plan may seem fool-proof, putting it into practice could reveal unforeseen pitfalls or drawbacks that require modification.
Temporary Fencing

Learning how to use temporary fencing is rather simple. There are only a few tools that you need.

- Polywire
- Polywire reels
- Step-in posts
- Temporary gates
- Fence tester
- Charger
Polywire

There are many different types of polywire available. It may be worthwhile experimenting with a few types before committing to one type for your entire farm. Some producers have indicated that the yellow or orange hued polywires are more difficult for cattle to see.
When choosing a type of polywire, make sure that you have the right step-in posts to accommodate its size or width. For example, as these pictures show polytape is better suited for certain types of step-in posts. The combination of step-in posts and polywire that works for you will largely be a product of your own personal preferences and what you enjoy using during you daily or weekly rotations.
Polywire Reels
Step-In Posts for Polywire Placement

Classic step-in posts have hooks at different levels allowing you to run multiple strands or strands at different heights.

This is a pigtail post. It does not allow you to set the polywire at different heights or to use multiple strands of polywire.
Temporary Gates for Moving Cattle

Plastic or insulated handles are a great way to create temporary gates using polywire. These devices attach to the polywire and hook on to another strand of polywire, step-in post, or other section of your fence. Having a handle allows you to move animals through a section of polywire or to walk through a section without having to turn off the fence. Some of them will conduct a charge through the insulated handle while others will not.
You can also use a PVC pipe with a notch cut at the top to create a temporary gate by lifting up either high tensile wire or polywire. Animals become accustomed to moving under the gate relatively quickly, but may require some coaxing at first. Wrap a piece of wire around the post to electrify it to prevent animals from rubbing up against it or knocking it down.
Fence Testers

Fence testers are a critical tool for a rotational grazing system. These devices allow you to test the voltage of your fence. Many of them also help you identify where a short is occurring, which helps fix the problem more quickly than having to walk the perimeter to identify the issue. Check fences on a regular basis for foliage growth, weather damage, and human error.
Fence Testers

Once animals are trained to electric fence, they usually do not challenge it or attempt to break through. Some animals will routinely test fences more than others, which is why it is important to keep a minimum level of voltage running through the fence at all times.

A higher voltage is typically required for small ruminants, whose smaller hoof prints often lead to reduced grounding, enabling them to touch the wire without receiving a shock.

- Above 5000 volts or more = Great animal control, ideal for small ruminants
- Above 4000 volts = Good animal control
- Above 3000 volts = Fair animal control, will likely contain cattle but not small ruminants
- Above 2000 volts = Poor animal control
- Above 1000 volts = Poor to no animal control
Choosing a Charger

The charger is the device that provides the power to electrify the fence. It is essentially the heart of your electrified fence system, which means it is important to make sure that you choose the appropriate size charger for your farm and for the length of electric fence that you intend to run. The charger converts main or battery power into a high voltage pulse or "shock" as felt by the animal when it touches the fence. In the past, electric fence chargers shorted out easily. Today's chargers are low impedance, meaning they are designed to effectively shock though vegetation and other foreign materials touching the fence.

There are three main types:

• 110V chargers
• Battery powered chargers
• Solar powered chargers
Choosing a Charger

It is important to choose the right size charger for your farm to make sure that you have enough power to provide sufficient voltage to your fence. When in doubt, choose the larger size to ensure that the fence will carry sufficient voltage. Also, a larger charger will allow you to increase the length of fence that you run in the future should you expand or build more fence.

As a general rule you'll need an energizer with a rating of 1 joule for every 6 miles of wire you want to electrify. For example, if you install 12 miles of electrified wire (4 miles of fence with 3 hot wires) your energizer should have a rating of at least 2 joules (12 miles @ 6 miles per joule = 2 joules).
110V Plug-In Chargers
Battery-Powered Chargers

Battery-powered chargers are an option for locations where conventional electric power is not available. These can be more expensive, especially when you add in the cost of the battery. It will probably also be necessary to replace the battery every 3-4 years. It is highly recommended to use a good deep cell marine type battery, which is designed to discharge more slowly and completely. Some of the larger battery energizers may require more than one battery.
Portable solar chargers offer a good solution for creating temporary electric fence in pastures that are too far from the permanent electric fence, or to test out electric fence. They draw energy from the sun. Some of them can also be hooked up to a battery and the solar panel will recharge the battery so that the system almost never runs out of power.
Electric Fencing for Small Ruminants
Small Ruminants

Electric fencing can be used to rotationally graze small ruminants just as well as cattle and horses. Due to their size, however, there are a few different approaches that a producer should keep in mind when setting up fence. Where one strand of high tensile or polywire is effective to keep most cattle and horses contained, sheep and goats learn quickly to duck underneath or to jump over a single strand.

Also, a single strand makes it easier for predators to infiltrate your pastures. Depending on your geographic location, small ruminants tend to be at a higher risk of predator pressure. Electric fencing serves a dual purpose of keeping small ruminants contained while keeping predators out. In many cases, existing fences intended for livestock can be modified or adapted for small ruminants.
When installing permanent high tensile wire for small ruminants, a variety of strands at different heights helps to discourage livestock from crawling under or over the fence while keeping predators out. The bottom wires of the fence are more closely spaced than the top wires. Wire spacing of approximately 6, 5, 5, 8 and 10 inches are typical.
Permanent Fencing for Small Ruminants

Many small ruminant producers choose woven wire or field fence as permanent perimeter fence because of the security that it provides. An electrified high tensile wire along the top or attached somewhere to the fence allows you to create temporary paddocks by cross-sectioning with polywire. The electrified wire discourages animals from climbing on the fence and keeps predators out.
Temporary Fencing for Small Ruminants

Temporary polywire and step-in posts can be used to keep small ruminants in pastures. For sheep, you will usually need at least two strands of polywire. Goats may require more because they are apt to jump over or crawl under fence.
Temporary Fencing for Small Ruminants

Electrified netting is another popular choice among small ruminant producers.
Never Underestimate a Goat

Goats are the most inclined to continually look for potential escape routes in a fencing system. Unlike cattle and sheep, goats naturally seek out higher ground, enjoy climbing, and are agile jumpers. Goats also have good memories when it comes to escape routes that were successful in the past, posing an ongoing challenge to farmers.
Never Underestimate a Goat

As a result, most goat producers use a combination of fencing types to contain goats, usually consisting of woven wire and an electrified wire at the top of the fence or running alongside. Woven wire alone can be effective unless the goats are able to climb it or push it over with their weight. The electrified wire discourages goats from jumping over the fence, pushing underneath, or climbing on the woven wire.
Goats Tend to Get Their Heads Stuck

Any producer who raises goats will likely have a story or two about how frequently goats get their heads/horns stuck in various types of fencing, usually woven wire. This leads many producers to disbud or dehorn their goats at birth to prevent them from getting stuck. In addition to the stress it places on the animal, a goat with its head stuck in the fence creates a prime opportunity for a predator to attack vulnerable prey.
Goats Tend to Get Their Heads Stuck

Some companies make woven wire fencing specifically for goats that has appropriate spacing to discourage goats from sticking their heads through the fence. Regardless, it is a good idea to keep a watchful eye when you introduce goats to a new fencing system to make sure an animal doesn’t get stuck for an extended period of time.
Costs & Comparisons
Cost Comparison of Fencing Types

Here are some rough estimates for the costs of the various types of fences discussed in this module. The cost estimates include all materials and assume a labor rate of $16.25/hour, which may differ in your region.

- Board Fence - four rail $9.00 - $10.00 per foot
- Barbed Wire 5 strand - $1.55 — $2.25 per foot
- Woven Wire - $2.00 — $4.50 per foot
- High Tensile Electric fence four wire - $.95 - $1.25 per foot (no energizer)
- Flex Netting Electric 40” height - $0.90 - $1.15 per foot (no energizer, temporary fence)
- Poly Wire with nine conducting wires in one strand - one wire $0.20 per foot (no energizer)

Costs based on current 2019 pricing, Arkansas
# Cost Comparison of Fencing Types

Estimated construction costs for fencing (based on 1,320 feet, ¼ mile):

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<tr>
<th>Type</th>
<th>Total cost</th>
<th>Cost per foot</th>
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<tr>
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<tr>
<td>Barbed wire, 5 strands</td>
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<td>High tensile, non-electric, 8 strands</td>
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<td>High tensile, electric, 5 strands</td>
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<td>Electrified polywire, 3 strands</td>
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Costs based on current 2019 pricing, Arkansas
## Comparison of Fencing Types

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<th>Pros</th>
<th>Cons</th>
<th>Best use</th>
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References

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- https://extension.uga.edu/publications/detail.html?number=C774&title=Fences%20for%20the%20Farm
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