An Introduction to Rotational Grazing

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

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This presentation is sponsored by the USDA Beginning Farmer and Rancher Development Program
Module Objectives:

- Understand the primary uses and benefits of rotational grazing
- Explain the basic principles of setting up a rotational grazing plan
- Review basic animal handling principles
Rotational grazing is a complex and widely researched subject. This presentation is intended to cover a few basic and introductory aspects of rotational grazing. Additionally, there are many approaches to rotational grazing and various philosophies. If you are interested in more information on rotational grazing, review the References & Resources slide at the end of this presentation or contact the Small Farms Program for assistance.

This presentation is primarily focused on using rotational grazing for beef cattle production, but many of these principles and approaches can be employed in small ruminant production.
What is Rotational Grazing?
What is Rotational Grazing?

There are several names used to describe the process of rotating cattle through designated pastures on a specific schedule, but they generally describe the same process and seek to achieve the same objective:

Limiting livestock’s access to pasture and controlling the speed at which they move to new pastures in an effort to increase forage efficiency and to promote pasture regrowth/regeneration, soil health, and animal health.

This is in comparison to a continuous grazing system where livestock are allowed access to the entire acreage and allowed to graze forage at their discretion.
Three Basic Characteristics of Rotational Grazing

1. Pastures are divided into smaller paddocks either with permanent fencing or temporary fencing

2. When not being actively grazed, pastures are allowed to rest and regrow

3. The timing of rotations is adjusted to the growth stage of the forage and/or changes in forage base between seasons
Benefits of Rotational Grazing
Many producers are curious about rotational grazing, but worried that implementing it will be too time-consuming or that it won’t provide the promised benefits. In the next few slides, we will review the many benefits of rotational grazing. Some of these benefits can be captured simply by implementing a few aspects of a rotational grazing system on your farm.
Benefit 1: Economics

- Beef cattle producers often have little control over the price that they receive for their animals, but they have complete control over the cost of inputs.

- The primary input cost for any beef cattle operation is feeding the animals during winter months and during times of pasture shortage. Improving forage and stockpiling forages for winter grazing can reduce the cost of supplemental feed or hay.

- By restricting cattle’s access to forage, cattle are not allowed to graze more desirable forages preferentially. Instead, cattle are required to consume a greater amount of less desirable forages in their allotted paddock during the grazing period. Once cattle are moved to new pasture, the recently grazed forages are allowed time to rest and regenerate.

- In a continuous grazing system, cattle can re-graze preferential forages as often as they like. This often leads to preferential forages being grazed out of a pasture while less desirable forages take over.
Benefit 1: Economics

- Researchers at the University of Missouri investigated the economic benefit of rotational grazing systems utilizing beef cow/calves and stockers.

- The project compared 3, 12, and 24 pasture rotational grazing systems. They found that the 24 paddock rotation returned the highest amount of gain per acre in the calves and steers, and had the highest net income, which was over $30 per acre higher than the 3 paddock rotation.

- This is after factoring in all of the costs of animal management and added costs for the fencing and watering systems. Depending on current cattle prices or if the producer direct markets his or her products, the profit margin may be even higher.

- Additionally, the more days the animals can spend grazing and harvesting their own nutritional requirements, the lower the operator’s production and labor costs will be. Getting started in rotational grazing usually requires a very small investment in fencing supplies such as an electric fence charger, polywire, and step-in posts (as long as you have access to water available).

(Moore and Gerrish, 2003)
Benefit 2: Pasture Productivity

- Rotational grazing improves soil health, which leads to decreased erosion, less runoff, and more diverse biological matter. It also helps mitigate the need for tilling and other damaging soil modifications.

- It improves manure distribution, resulting in a more even application. In continuous grazing systems, cattle tend to congregate in the same area, usually near shade, feed, or water.

- It can increase the amount of forage harvested per acre compared to a continuous grazing system by as much as 2 tons of dry matter per acre.
Benefit 3: Animal Health & Welfare

- Rotational grazing provides animals with fresh pasture on a regular basis, reducing their exposure to parasites and other illnesses.
- Increased freedom of movement encourages physical health compared to keeping cattle in a confined area.
- Many graziers report fewer health problems after implementing a rotational grazing system, with some reporting that culling due to health reasons dropped from roughly 35% to 10%.
- Some studies suggest that regular rotations more accurately mimics cattle’s natural behaviors.
Benefit 4: Environmental Stewardship

• Well-managed pastures have fewer instances of soil erosion and runoff. Ensuring that pastures are not overgrazed and allowed adequate rest encourages soil health and strong plant roots. Rotational grazing can also lead to increased water quality in nearby waterways due to reduced use of pesticides and fertilizers as well as combatting soil erosion.

• Rotational grazing can help encourage the growth of favorable forages while decreasing the presence of weeds and undesirables. This has led to reduced reliance on pesticides for many graziers.

• Due to the more even dispersal of manure throughout paddocks, many graziers rely less on fertilizer inputs.

• There are many wildlife advantages that rotational grazing provides, including increased habitat and less disturbance as pastures are given adequate rest periods. Leaving suitable forage in the pasture.
Benefit 5: Minimal Labor

- Studies show that the time it takes to move livestock to a new paddock is minimal once cattle become accustomed to the process, often averaging only 15 minutes per day. Experienced graziers report that moving a large herd takes no more time than moving a small herd. Cattle move in groups and once the leader cattle begin moving to the new pasture the rest of the herd follows close behind.

- Efficient grazing and stockpiling of forage may also reduce labor spent on cutting or acquiring hay, which can take an estimated 7 hours per acre.

- Rotating cattle throughout paddocks also improves manure dispersal and results in a more even spread of manure throughout the farm. This can reduce time spent spreading litter.
Benefit 6: Flexibility & Longevity

- Rotational Grazing is Adaptable — As your farm goals, financial needs, and other variables change, you can also adapt your rotational grazing plan to accommodate them. This also includes accommodating changes in weather pattern and animal nutrition needs.

- Rotational Grazing Generates Long-term Benefits — After a few years of implementing a rotational grazing management plan, most farmers report seeing several improvements on their farm and in their operation. This includes healthier soils, more diverse and abundant forage, healthier animals, and improved biodiversity.
Setting up a Rotational Grazing System on your Farm
Words of Wisdom for New Graziers

Many new graziers make the mistake of thinking of rotational grazing as an end goal or final destination. In reality, grazing management must be approached fluidly and treated as a farming ideology rather than something to be conquered. In the same way that your farm is a continual work-in-progress, your rotational grazing management plan and related objectives will also be a continual work-in-progress.

Without a doubt, you will have countless questions along the way. It can be frustrating at times to know whether you are doing something “right,” or whether your efforts will be rewarded with the desired outcomes. Fortunately, there are countless grazing resources beyond this module and networks of experienced graziers who will be eager to guide you along the way.
Initial Considerations

Rotational grazing is not a one-size-fits-all exercise. Each farmer’s management plan will be as unique as his or her individual farm.

Although it’s important to create a grazing plan for each year, circumstances can change. It’s important to be flexible throughout the year and to modify your plan based on changes in forage growth, weather, drought, animal health, stocking density, and your business goals.
Six Basic Steps to Creating a Grazing Management Plan

There are many approaches to developing a grazing management plan. Here is a six-step approach that many new graziers find beneficial:

1. Map your Farm
2. Identify your Forage Base
3. Locate Key Resources
4. Calculate Forage Requirements
5. Design Paddocks
6. Observe & Adjust
Step 1: Map your Farm

There are several ways to obtain an aerial map of your farm:

- Pull up your address on Google Earth and take a screenshot
- Real estate transaction documents/appraisals
- Contact your local NRCS and/or extension offices to see if they provide farm mapping services
- Once you have a map of your farm, scan a copy and save it for future management plans.
- Print a copy of the map. Copy shops can print larger sized maps.
- Place the map in a sheet protector or have it laminated. This allows you to use dry erase markers to play around with different paddock designs.
Step 1: Example

This map was taken from Google Maps. Google Earth will provide a similar image.
Step 1: Example

If you are unable to obtain or print a map of your farm, you can draw one using pen and paper or on a computer program like PowerPoint. Here is an example of a drawing of the farm depicted in the previous slide.
Step 2: Identify your Forage Base

- Understanding the different forages growing in your pastures throughout the year is critical to proper grazing management.

- It is best to graze certain forages during specific times of year. For example, understanding when a forage might be coming on strong can help you know when to take advantage of its rapid growth and to graze it aggressively.
Step 2: Identify your Forage Base

• The best way to learn about your forage base is to simply walk through your pastures. Bring a map of your farm or a notebook to take notes on what you find. Although some farms are uniform in their forage base, many farms feature unique and changing forage bases throughout their acreages.

• Your local NRCS and/or extension office can assist you with identifying forages. There are also several online-based resources that provide information about forages and when they are best grazed.
  • One resource being the University of Arkansas, Division of Agriculture, Research & Extension: https://www.uaex.edu/farm-ranch/resource-library/forages-id-database/gallery.aspx
Step 2: Identify your Forage Base

• Here are some questions and things to consider as you walk through your pastures. Be sure to look through the different layers if the forage is tall:
  • Do certain areas of your farm have more warm season grasses or cool season grasses?
  • Is one type of forage predominating, to the detriment of other forages below the predominate forage canopy? If so, grazing the predominant forage when it is coming on early in a season can help knock it back to improve growth opportunities for other forages and overall forage diversity.
  • Does one area have an abundance of lower quality forages? If so, this may be a good area to work on improved pasture fertility through targeted grazing.
  • Are certain areas prone to flooding during storms? These areas likely have lower quality forages or will be susceptible to punching/pugging when wet.
  • What percent of the forage base is weeds/forbs? Not all weeds are as undesirable as you may think. Cattle will graze certain weeds, while sheep often graze certain varieties preferentially.
  • Are there any areas of exposed or bare soil? This can indicate poor pasture health and poor soil health.
Step 2: Identify your Forage Base

Here is a sample of how you can make rough notes about the variances in forage quality and type throughout your farm. It’s best to provide as much detail as you can, but if you are still learning how to assess forage, simple notes will suffice.
Understanding the types of forages in your pastures throughout the seasons should be one of your biggest goals as a grazier.

There are many different resources to help you identify forages, their growth stages, and which seasons are ideal for grazing them versus stockpiling them:

- Your local NRCS office
- Your state’s grazing lands specialist
- Local university/extension agents
- Online resources
Obtaining a soil test is a good way to understand your forage base and overall pasture health. Your local NRCS office or university extension service can provide you with a free soil test in most instances and help you interpret the results. Be sure to tell them that you are implementing a rotational grazing plan so that they can better understand your overall goals. If you are unsure what type of soil is on your farm, you can also obtain a soils map from the NRCS office or by using the Web Soil Survey tool at https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

At the start of a rotational grazing plan, take a yearly sample until your pastures have stabilized. After that, studies recommend testing every three years to verify continuity and to address any changes. Observing your pastures after grazing can also indicate soil health because some forages thrive in high pH soils while others thrive in low pH soils.
Step 3: Locate Key Resources

- The size and location of your paddocks will be tied to two key factors:
  - Water - Research suggests that cattle should not be required to walk further than 800ft to a water source. This will also encourage increased water consumption.
  - Shade/Shelter - Shade becomes critical in summer, while shelter becomes critical during storm seasons. Also, consider providing additional shelter during calving season.
Step 3: Locate Key Resources

- A third resource worth keeping in mind is any handling facility or loading area.
  - If you will need to move animals on a trailer at any point during the season, it’s best to rotate them towards the easiest loading-out point on the farm.
  - If you plan to work animals at specific times of the year, it’s best to rotate animals towards the handling facility.
  - Although it is possible to move livestock from any point on your farm to the loading area or handling facility, moving livestock through fresh pasture can be frustrating and time consuming because the animals often stop and graze. If you must move animals through fresh pasture, try to move them when they are full and less inclined to stop.
Step 3: Example

In this diagram, ponds are noted with blue circles. The handling facilities/corral is marked in orange. The map also shows wooded areas that provide shade/shelter. If you are using a drawing, be sure to shade or mark wooded areas.
Step 4: Calculate Forage Requirements

In a rotational grazing system, determining the livestock's forage requirements, the size of paddocks, and how quickly to rotate the livestock can be overwhelming. There are many factors to consider when deciding how long to let cattle graze a certain area such as weather, drought, goals, and animal nutrition needs. These factors can change on a weekly basis.

The most important thing to remember when learning how to time rotations is that any “mistake” you make is totally reversible over time. Be flexible in your approach and remember that in rotational grazing you learn the most by applying the principles to your unique farm, observing how the land responds, and making better-informed decisions based on your observations.
Methods for determining the timing of rotations vary from simple principles to specific calculations. For beginners, the following principles will provide a sufficient way to determine how frequently cattle must be moved:

1. Take half, leave half
2. It takes grass to grow grass

Remember, plants require adequate leaf area for photosynthesis, so ensuring that the cattle leave the needed leaf area on forages is key to making the most of a rest period. If plants are grazed down to the soil, it will take much longer for the plant to regenerate due to the lack of leaf area.
Under the *Take Half, Leave Half* approach, you can set up a few paddocks and observe cattle to determine how long it takes them to graze the available forage halfway. If it takes the cattle two days to reach halfway, then you should plan to move your cattle to fresh pasture every two days.

The more area you provide cattle in each pasture, the longer it will take them to graze it to the halfway point. If you are only able to move animals once a week, for example, then you should aim to create paddock sizes that will provide cattle with enough forage for the seven day period without grazing past the halfway point.
The beginning of spring calls for a slightly different approach. The first time a pasture is grazed in the spring should be started when new growth reaches 4 inches in height and grazed until the height is 2-3 inches. This will keep pastures from maturing too fast and move the animals rapidly through all the pastures to establish a staggered forage regrowth pattern necessary for the rest of the grazing season. If the forage reaches a certain point of maturity, the cattle will no longer find it as palatable.
Step 4: Calculate Forage Requirements

Once plants mature, most energy is allocated to flower and seed production. Although the plant grows quickly at this stage, the quality of the forage is very low because a larger percentage of the nutrients in the plant are tied up in unpalatable or indigestible forms like lignin or fiber.

Based on this, graziers usually aim to graze forage after a period of rapid growth but before the plant begins to flower or seed. Because forages develop and reproduce at different rates, the best time to graze one forage may not be ideal for other forages present in the pasture.

Many universities and resource providers have developed geographic-specific or season-specific guides indicating when certain forages should be grazed and to what height. A brief Google search will likely help you find any such specific resources for your area.
Step 4: Calculate Forage Requirements

If you’re a brand new grazier, the Take Half, Leave Half approach will suffice until you’ve mastered the basics and feel comfortable with the concept.

Beyond this approach, there are many advanced methods for determining the size of paddocks and how frequently animals should be moved. Once you feel comfortable with the basic principles, you can use grazing sticks and animal unit calculations to achieve more precise management of your paddock sizes and rotations.

Although calculations are helpful, remember to also stand back and observe how the land responds to your grazing plan and to incorporate your observations in your decision making process.
For many new graziers, obtaining a grazing stick is the next step to intensifying the level of forage management.

A grazing stick will help you calculate the amount of available forage in a pasture. It also includes information on how to calculate the needs of specific animal groups (dry cows vs. lactating cows), while advising on how many inches to leave for certain forages to ensure adequate regrowth during rest.

Grazing sticks are available at some NRCS and/or extension offices.
Step 4: Calculate Forage Requirements

A grazing stick contains a lot of information about various species, nutritional requirements, and dry matter forage. The term ‘dry matter’ refers to the amount of material remaining after the moisture content has been removed.

If you are using a grazing stick to determine how many days you can graze a paddock, you will use the following equation:

\[
\frac{(\text{Total Pounds of Forage per Acre}) \times (\text{Number of Acres}) \times (\text{Grazing Efficiency Rate})}{(\text{Animal Weight}) \times (\text{Intake Rate in \% of Body Weight}) \times (\text{Number of Animals})}
\]

Let’s look at each of these factors separately…
Step 4: Calculate Forage Requirements

(Total Pounds of Forage per Acre) x (Number of Acres) x (Grazing Efficiency Rate)
(Animal Weight) x (Intake Rate in % of Body Weight) x (Number of Animals)

Total Pounds of Forage per Acre — Most grazing sticks include a chart that estimates the dry matter in pounds per inch. Here is one example from the Arkansas Grazing Lands Coalition Grazing Stick:

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermuda</td>
<td>100-250</td>
<td>250-400</td>
<td>400-550</td>
</tr>
<tr>
<td>Caucasian Bluestem</td>
<td>100-200</td>
<td>200-300</td>
<td>300-400</td>
</tr>
<tr>
<td>Native Tall Warm Season</td>
<td>50-100</td>
<td>100-200</td>
<td>200-300</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>150-250</td>
<td>250-350</td>
<td>350-450</td>
</tr>
<tr>
<td>Fescue + Legumes</td>
<td>100-200</td>
<td>200-300</td>
<td>300-400</td>
</tr>
<tr>
<td>Red Clover or Alfalfa</td>
<td>150-200</td>
<td>200-250</td>
<td>250-350</td>
</tr>
<tr>
<td>Orchardgrass + Legumes</td>
<td>100-200</td>
<td>200-300</td>
<td>300-400</td>
</tr>
<tr>
<td>Mixed Pasture</td>
<td>150-250</td>
<td>250-350</td>
<td>350-450</td>
</tr>
</tbody>
</table>
Step 4: Calculate Forage Requirements

(Total Pounds of Forage per Acre) x (Number of Acres) x (Grazing Efficiency Rate)
(Animal Weight) x (Intake Rate in % of Body Weight) x (Number of Animals)

Assume you had 15 acres of fescue and legumes that was in good condition. Your first number for this equation would be something between 200-300 pounds of forage per acre. The second number would be 15 to represent the total number of acres.

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermuda</td>
<td>100-250</td>
<td>250-400</td>
<td>400-550</td>
</tr>
<tr>
<td>Caucasian Bluestem</td>
<td>100-200</td>
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<td>Native Tall Warm Season</td>
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<td>100-200</td>
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</tr>
<tr>
<td>Tall Fescue</td>
<td>150-250</td>
<td>250-350</td>
<td>350-450</td>
</tr>
<tr>
<td>Fescue + Legumes</td>
<td>100-200</td>
<td>200-300</td>
<td>300-400</td>
</tr>
<tr>
<td>Red Clover or Alfalfa</td>
<td>150-200</td>
<td>200-250</td>
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<tr>
<td>Orchardgrass + Legumes</td>
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<td>200-300</td>
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<tr>
<td>Mixed Pasture</td>
<td>150-250</td>
<td>250-350</td>
<td>350-450</td>
</tr>
</tbody>
</table>
Step 4: Calculate Forage Requirements

\[(\text{Total Pounds of Forage per Acre}) \times (\text{Number of Acres}) \times (\text{Grazing Efficiency Rate})\]

\[(\text{Animal Weight}) \times (\text{Intake Rate in } \% \text{ of Body Weight}) \times (\text{Number of Animals})\]

The third factor is **Grazing Efficiency Rate**, or how much of the pasture you want to graze at a time. When in doubt, the Take Half, Leave Half approach will work. Use 0.5 as the grazing efficiency rate under this approach.

The more paddocks you have available in your grazing system, the higher your grazing efficiency rate will become. In other words, more pastures allows you to graze each paddock more aggressively because the availability of many other pastures allows for ample rest time.
Step 4: Calculate Forage Requirements

\[(\text{Total Pounds of Forage per Acre}) \times (\text{Number of Acres}) \times (\text{Grazing Efficiency Rate})\]
\[(\text{Animal Weight}) \times (\text{Intake Rate in \% of Body Weight}) \times (\text{Number of Animals})\]

Most grazing sticks include a suggested **grazing efficiency rate** to use that increases based on the number of paddocks that you can make in your system. Here is an example:

<table>
<thead>
<tr>
<th>Number of Paddocks</th>
<th>Grazing Efficiency Rate - %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (continuous grazing)</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>16</td>
<td>40</td>
</tr>
</tbody>
</table>
Step 4: Calculate Forage Requirements

\[(\text{Total Pounds of Forage per Acre}) \times (\text{Number of Acres}) \times (\text{Grazing Efficiency Rate})\]
\[(\text{Animal Weight}) \times (\text{Intake Rate in } \% \text{ of Body Weight}) \times (\text{Number of Animals})\]

In the same example, if we were grazing an area that allowed for 8 paddock divisions, we would use 0.5 as the grazing efficiency rate. If you don’t know how many paddocks you will create, use the Take Half, Leave Half principal and enter 0.50 for the grazing efficiency rate.

The top row of our calculation would look like this:

\[(250) \times (15) \times (0.5)\]
\[(\text{Animal Weight}) \times (\text{Intake Rate in } \% \text{ of Body Weight}) \times (\text{Number of Animals})\]
Step 4: Calculate Forage Requirements

(Total Pounds of Forage per Acre) x (Number of Acres) x (Grazing Efficiency Rate)  
(Animal Weight) x (Intake Rate in % of Body Weight) x (Number of Animals)

Turning to the bottom row of the equation, the animal weight refers to the average animal weight of the animals in your herd or designated grazing group. When in doubt 1,000lbs is a good approximation.

The second factor is Intake Rate in Percent of Body Weight. Grazing sticks will usually provide a chart to designate the intake rate for different animal groups. Here is an example:

<table>
<thead>
<tr>
<th>Type</th>
<th>Intake Rate in % of Body Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Cow</td>
<td>2%</td>
</tr>
<tr>
<td>Lactating Cow</td>
<td>3-4%</td>
</tr>
<tr>
<td>Dairy Cow</td>
<td>2.5% - 3.5%</td>
</tr>
<tr>
<td>Steer</td>
<td>2.5% - 3.5%</td>
</tr>
</tbody>
</table>
Step 4: Calculate Forage Requirements

\[
\text{(Total Pounds of Forage per Acre)} \times \text{(Number of Acres)} \times \text{(Grazing Efficiency Rate)} \\
\text{(Animal Weight)} \times \text{(Intake Rate in \% of Body Weight)} \times \text{(Number of Animals)}
\]

Assume for our example that we are finishing a herd of steers in a rotational grazing system. Using the middle intake rate of 3\%, we would input 0.03 as the second factor on the bottom row of the equation.

\[
(250) \times (15) \times (0.5) \\
(1,000) \times (0.03) \times \text{(number of animals)}
\]

The final factor is the number of animals in your herd. Let's assume we have 30 head of steers.

\[
(250) \times (15) \times (0.5) \\
(1,000) \times (0.03) \times (30)
\]
Step 4: Calculate Forage Requirements

(Total Pounds of Forage per Acre) x (Number of Acres) x (Grazing Efficiency Rate)
(Animal Weight) x (Intake Rate in % of Body Weight) x (Number of Animals)

With the factors determined, we are ready to do the final calculation:

\[
\begin{align*}
(250) \times (15) \times (0.5) & \\
(1,000) \times (0.03) \times (30) & \\
1,875 & \\
900 & \\
\end{align*}
\]

Total Grazing Days = 2.08

Rounding this figure to the nearest whole number, our calculation tells us that we can graze the herd of 30 finishing steers on the 15 acres of fescue and legume pasture for roughly 2 days.
Step 4: Calculate Forage Requirements

If you know that you want to move animals at a set rate, such as every 2 days, you can use the grazing stick to tell you how many animals to stock in each paddock. Having paddocks that are relatively even in size is important for this calculation. Here is the formula:

\[(\text{Total Pounds of Forage per Acre}) \times (\text{Number of Acres}) \times (\text{Grazing Efficiency Rate}) \]
\[\frac{(\text{Animal Weight}) \times (\text{Intake Rate in % of Body Weight}) \times (\text{Number of Days})}{(1,000)}\]

Note that the last factor on the second line differs from the previous calculation. Let’s assume that we want to run cows and calves on a 24 acre farm of mixed grasses in good quality. Let’s assume that we’ve subdivided the 24 acres into six 4-acre pastures and that we want to move cattle every 2 days.

\[
\frac{(300) \times (4) \times (0.04)}{(1,000) \times (0.035) \times (2)}
\]
Step 4: Calculate Forage Requirements

Completing the equation:

\[
\frac{(300) \times (4) \times (0.50)}{(1,000) \times (0.035) \times (2)}
\]

\[
\begin{array}{c}
600 \\
70 \\
\end{array}
\]

8.5

The appropriate number of cows to stock for this 24 acre, six-paddock farm with 2-day rotations is 8-9 head.
Step 4: Calculate Forage Requirements

- These YouTube tutorials provides a visual demonstration on how to use a grazing stick in the field:
  - https://www.youtube.com/watch?v=bSYflqjP6B0
  - https://www.youtube.com/watch?v=XUNNFeonK3U
  - https://www.youtube.com/watch?v=ipLR6Q7vKqw

- As with most things in rotational grazing, there is no one-size-fits-all approach to using a grazing stick. It depends on your goals as a producer, the condition of your pastures, and the needs of your individual animals.
Some graziers also use the animal units method to determine the size of paddocks and the timing of rotations. The first step in this approach is to determine how much forage your animals will require on a daily basis using a measurement called an animal unit (AU). One animal unit is typically equivalent to the daily forage intake of a 1,000-pound dry cow, which requires 30lbs of dry matter per day.

### Beef Cattle Type

<table>
<thead>
<tr>
<th>Beef Cattle Type</th>
<th>Animal Unit Equivalency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000lb Dry Cow</td>
<td>1.0</td>
</tr>
<tr>
<td>1,300lb Dry Cow</td>
<td>1.3</td>
</tr>
<tr>
<td>1,000lb Lactating Cow</td>
<td>1.4</td>
</tr>
<tr>
<td>1,300lb Lactating Cow</td>
<td>1.6</td>
</tr>
<tr>
<td>2,000lb Mature Bull</td>
<td>1.7</td>
</tr>
<tr>
<td>550lb Finishing Steer @ 2lb per day gain</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Step 4: Calculate Forage Requirements

Paddock size depends on the AU of the herd, the amount of available pasture at the beginning of grazing, and the desired grazing period. Available pasture is pasture present in a paddock at the start of grazing minus the amount present when the animals are removed from the paddock. One way to determine how many paddocks you need is to calculate how long you want each pasture to rest. The length of a rest period often depends on the season and weather:

<table>
<thead>
<tr>
<th>Season</th>
<th>Weather</th>
<th>Growth Rate</th>
<th>Rest Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>Cool, moist</td>
<td>Fast</td>
<td>10-14</td>
</tr>
<tr>
<td>Spring</td>
<td>Warm, dry</td>
<td>Medium</td>
<td>14-20</td>
</tr>
<tr>
<td>Summer</td>
<td>Hot, moist</td>
<td>Slow</td>
<td>25-30</td>
</tr>
<tr>
<td>Summer</td>
<td>Hot, dry</td>
<td>Very Slow</td>
<td>40-60</td>
</tr>
</tbody>
</table>

The best way to manage this situation is to have a flexible rotational scheme, moving animals to those paddocks that have reached their optimum available pasture. Animals should be kept off a particular paddock until it reaches its desired optimum available pasture.
Step 5: Design Paddocks

With your forage base identified, key resources mapped, and forage requirements calculated, you are now ready to start designing temporary paddocks.

Chances are there are endless possible combinations of temporary paddocks that you can create on your farm. Do not get overwhelmed! Much of rotational grazing involves trial and error — or in a more positive light, trial and modification.

When designing your first grazing system it’s best to keep things simple. This will allow you to get a feel for rotational grazing, to see how your forage base responds, and to observe what may work best for the next paddock, season, and year.
Step 5: Design Paddocks

Here are a few general rules to keep in mind when you are designing paddocks. We will discuss each of these rules in turn.

1. Keep cattle within 800ft of water.
2. Follow the natural contours and features of the landscape when drawing paddocks.
3. Size paddocks according to common grazing capacity/forage type, not an equal number of acres.
4. Size paddocks according to similar forage and soil quality.
5. Incorporate lanes and gates to facilitate smooth and efficient transitions to new paddocks.
Step 5: Design Paddocks

When determining the size, shape, and location of your paddocks, there are a few general guidelines to keep in mind. In some instances, you may not be able to adhere to all of these principles.

1. Keep livestock within 800 feet of a water source. — Studies show that cattle graze less efficiently and uniformly when required to walk more than 800 feet to water. It may also have a negative impact on their overall condition or ability to gain weight. Here are some sample options for dividing a 40 acre pasture. Note that in each sample the water source is the focal point for determining where to locate temporary fences.

- Block Grazing
- Strip Grazing
- Spokes of a Wheel
2. Follow the contour lines of landscape when determining paddock boundaries. If there are natural boundaries on your property like tree lines, rivers/creeks, or hills, incorporate these in your paddock design as opposed to fighting them.
Step 5: Design Paddocks

3. Size paddocks according to similar grazing capacity, not similar acres - Not all paddocks will contain a similar type or equal amount of forage. This is why it is critical to learn how to calculate the estimated amount of dry matter in a pasture before determining paddock size.
Step 5: Design Paddocks

4. Evaluating the comparative quality of different areas of your pastures will also help achieve consistency with other aspects of your system such as the animal’s daily diet as well as ensuring that each paddock receives adequate rest. Creating a map of your property that rates pasture quality can help aid in this guideline.
Step 5: Design Paddocks

5. Incorporate lanes and gates in your paddock design for moving animals — This allows you to move livestock from one paddock to another without traversing other paddocks. Moving cattle through new paddocks can be frustrating, especially if the cattle decide to stop and graze along the way. This also ensures that dormant pastures will be allowed true, uninterrupted rest periods, and allows you to bring the herd up to a handling facility or loading area without needing to traverse large, open sections of your pastures. Polywire and step-in posts can be used to easily create temporary lanes.
Step 5: Example

Using our example map, begin marking places where it may be useful to construct permanent fencing. You can test placement of permanent fencing with temporary fencing to make sure that it works for your system and grazing plan. Permanent fencing is noted on this diagram in red.
Step 5: Example

Continue subdividing the pastures keeping parameters like water, forage type, and forage quality in mind.
Step 5: Example

Use natural barriers like streams to determine where subdivisions should be placed.
Step 5: Example

Subdivide across watering sources so that the livestock will have access to the water on either side of the fence.
Step 5: Example

Including lanes will make it easy to move livestock between paddocks. As the paddock on the far right shows, you can also keep watering sources in a lane and allow cattle access to the lane and watering source.
Once you have marked the placement of your permanent internal fence, you can begin subdividing into paddocks. The number of smaller paddocks required depends on many factors, including herd size, nutritional needs of a specific group, forage base, time of year, weather, etc.

*Note that if a paddock does not have direct access to water, you must leave an open fence for cattle to get to water in the lane.*
With your plan assembled, it’s time to set up temporary paddocks and watch what happens. As you become more experienced, you will likely generate your own checklist of things to observe each day, but here are a few ideas to get you started.
Step 6: Observe & Adjust

- Observation: Which forages are they grazing first, i.e., preferentially?

- Indications:
  - If cattle are grazing a certain forage preferentially, it is important to ensure that they do not overgraze it.
  
  - Once the preferential forage has been grazed, the cattle will be forced to graze the less-desirable forages. This is an excellent way to reduce the population of undesirable forages in your pastures while also increasing forage efficiency. Cattle will graze undesirable forages once the preferential forages have been grazed.
Step 6: Observe & Adjust

- **Observation:** Which areas of the pasture are they grazing more heavily than others?

- **Indications:**
  - This may help indicate whether they are too far from water or shade/shelter, because cattle will tend to stay close to these important resources.
  
  - It may also indicate that there is a variety of forage in the pasture. Sometimes cattle preferentially graze a certain type of forage and leave less desirable forages behind.
Step 6: Observe & Adjust

- **Observation:** When you arrive to check the animals, are they standing/lying down chewing their cuds, actively grazing, or standing at the polywire bellowing?

- **Indications:**
  - Once cattle are accustomed to being moved to new pasture, they learn to stand at the polywire when a person shows up with the hopes of being moved.
  - In some cases, the cattle have grazed down both preferential and undesirable forages and are ready for new pasture. Although you may have allocated a specific number of days for a paddock in your management plan, pay attention to the forage and when the cattle are telling you that they need to be moved.
  - But, don’t be easily fooled! Cattle will sometimes lie about when they are ready to be moved, especially if there is a visible stand of preferential forage on the other side of the polywire.
  - The nutritional needs of your herd will help you decide whether to indulge their early demands to be moved, or to require them to graze more undesirables in their current paddock. For example, nursing mothers have higher nutritional needs than dry cows.
Step 6: Observe & Adjust

• Observation: Observing pastures during rest is just as important as observing pastures during grazing. How quickly is the forage growing? What types of forages are growing? Are you noticing any new forages that are no longer being shaded out or overcrowded by prior forages?

• Indications:
  • If pastures are taking too long to regrow, it could be due to overgrazing. Other factors may be present such as lack of rain, poor soil health, changing seasons.

  • If new forages are showing up, be sure to identify them. If you are using grazing to improve overall pasture health, the arrival of new forages could be an indication that your grazing plan is working and that the pastures are becoming more diversified.
Planning for Next Year

Here are some metrics/data to collect throughout the grazing season to help you identify strengths and weakness of your plan:

- Weights of various groups (i.e., heifers, steers, cows) at regular intervals (i.e., weekly, monthly).
- Weaning weight of calves
- Weight of steers at processing
- Number of days grazing vs. number of days feeding hay
- Number of heifers that breed successfully upon first exposure
- Number of cows that breed back each year
Moving Animals to New Pasture
Moving Cattle to New Pasture

The process of moving your livestock to a new paddock is incredibly easy. Cattle are creatures of habit and they adapt quickly to a rotational grazing system. It doesn’t take long for cattle to learn what it means when a strand of polywire is reeled up or raised up, allowing them access to a fresh stand of pasture.

In most cases, the cattle will line up eagerly at the polywire or gate and move into the new pasture as soon as they are able.
Moving Cattle to New Pasture

Many producers use a specific verbal call to invite their cattle to new pasture when the cattle are not waiting at the gate or polywire to be moved. Using the same call or phrase each time you move the cattle will help them learn what the call means.

In most cases, it only takes one person to move the cattle, especially if they are ready to be moved. You may need to walk into the prior pasture to drive out any straggler cattle.

Cattle can be moved through permanent gates, under raised polywire, or simply by reeling up a strand of polywire. It only takes a few moves for cattle to get used to a new way of moving.
Basics of Low-Stress Animal Handling

Because rotational grazing requires you to move and interact with your animals frequently, it is important to have calm, low-stress livestock. There are a few key principles of animal handling that will assist you in moving animals efficiently while keeping them calm and making them easy to handle over the long-run. Dr. Temple Grandin at the University of Colorado is perhaps the most well-respected authority on proper animal handling techniques.

The following interview provides a good explanation of some of Dr. Grandin’s teachings and basic principles:

- [https://www.youtube.com/watch?v=hWqN1T5b-b4](https://www.youtube.com/watch?v=hWqN1T5b-b4)
Basics of Low-Stress Animal Handling

According to Dr. Grandin, animals can be moved calmly and efficiently by using the positioning and movement of your body in correlation to animal’s flight zones and pressure points. Whether you are new to animal handling or a seasoned expert, reviewing Dr. Grandin’s basic rules is helpful.

Most of her principles on basic animal handling can be found in her paper titled “Understanding Flight Zone and Point of Balance for Low Stress Handling of Cattle, Sheep, and Pigs.” available at: https://www.grandin.com/behaviour/principles/flight.zone.html

The excerpted graphic on the next slide provides a visual depiction of how cattle respond to human movement based on positioning and movement. The following videos provide additional explanations of Dr. Grandin’s teachings:

- Cattle Handling in Crowd Pens - https://www.youtube.com/watch?v=Cpggjn_G6NU
- Handling Cattle Quietly in Pens - https://www.youtube.com/watch?v=acDrG9b5uko
- Moving Cattle on Foot - https://www.youtube.com/watch?v=g6Sxfw4F_qQ
FLIGHT ZONE AND POINT OF BALANCE. To move a single animal forward, the handler must be behind the point of balance and stay out of the blind spot directly behind the animal. When the handler is close to the animal, the point of balance is at the shoulder. When the handler is farther away, the point of balance may move forward to just behind the eye. When the handler is on the outer edge of the pressure zone, the animal becomes aware of the handler’s presence and turns around and looks. When the outer-most edge of the flight zone is penetrated, the animal moves away.
Moving Mothers & Calves

Rotating cows with newborn calves or mature calves is not much different than rotating mature cattle, but there are a few things to keep in mind.

Cows with newborn calves may have hidden their babies somewhere in the pasture. Cows can become very eager to move to new pasture and become temporarily absentminded about bringing their babies along. If you are moving cows with young calves to new pasture, be sure to conduct a sweep through the prior pasture after moving to ensure that there aren’t any babies left behind.

Although most calves will follow their mother’s lead, some calves have trouble understanding the moving process during the first few attempts, especially if they are away from their mothers at the time of moving. They may require a little more coaxing to walk under a polywire or through a gate. This is especially true if the calf has been shocked by the polywire and is reluctant to get too close to it again. You may need to walk into the prior pasture and drive the calves out on foot/ATV.
Moving Mothers & Calves

When grazing in a paddock that’s defined by polywire, some calves may be small enough or clever enough to slip under the wire. Some producers encourage this behavior and refer to it as creep-grazing. The calves are allowed access to new/preferential pasture, providing additional nutrition and increasing their growth.

In some cases, a calf is reluctant to walk back under the polywire, especially if it has been shocked in the past. You may need to lift up the polywire and drive the calf under in order to reunite it with its mother for nursing.
Animal Handling Video Resources

The following videos provide demonstrations of moving cattle to new pasture that also contain information about fencing, rotations, and general pasture management:

- [https://www.youtube.com/watch?v=sNbgcY3tk7s](https://www.youtube.com/watch?v=sNbgcY3tk7s)
- [https://www.youtube.com/watch?v=-KoZeEWJkEU](https://www.youtube.com/watch?v=-KoZeEWJkEU)
Training Cattle to Electric Fence

If cattle have never been exposed to electric fence, it's usually a good idea to spend some time training them. It is difficult to predict how an animal will react the first time that it comes into contact with hot wire. Some simply balk, while others may take off running or unintentionally damage the temporary fence and/or nearby permanent fence.

In a paddock or area with permanent fencing, string a temporary hot wire 2/3 of the way across a pasture. Place the livestock's water, mineral, and/or feed at one end of the paddock. The livestock will learn that they must go around the hot wire to avoid being shocked.
References

- http://static1.1.sqspcdn.com/static/f/932834/22471114/1366130557413/grazing-pasture-stick.pdf?token=0fZVJNafuIrJ97TaDQMUJ47u38%3D
- https://extension.psu.edu/four-steps-to-rotational-grazing
- https://slideplayer.com/slide/4687680/
- https://beef.unl.edu/cattleproduction/forageconsumed-day
- www.onpasture.com

- All photos found via Google Images
This presentation is part of an educational modular program designed to provide new and beginning farmers and ranchers with relevant information to initiate, improve and run their agricultural operations.

USDA-NIFA-BFRDP 2017 – 01804

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- Phillip Moore, Ph.D.
- Amanda Ashworth, Ph.D.
- Margo Hale, M.S.
- Michael Gold, Ph.D.
- Anne Fanatico, Ph.D.
- Ondieki Gekara, Ph.D.