
# Pasture for Profit: Managing Intensive Grazing Systems For Animal Production

**Rocky Lemus**

**Extension Forage Specialist**

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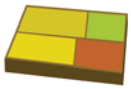


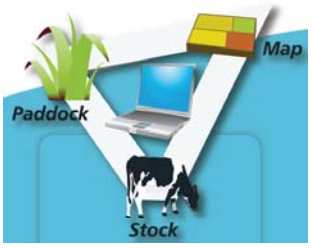
## Why the Need to Improve Grazing Systems?

- Approximately 80% of the pastures in MS suffer from poor and uneven fertility coupled with serious weed management.

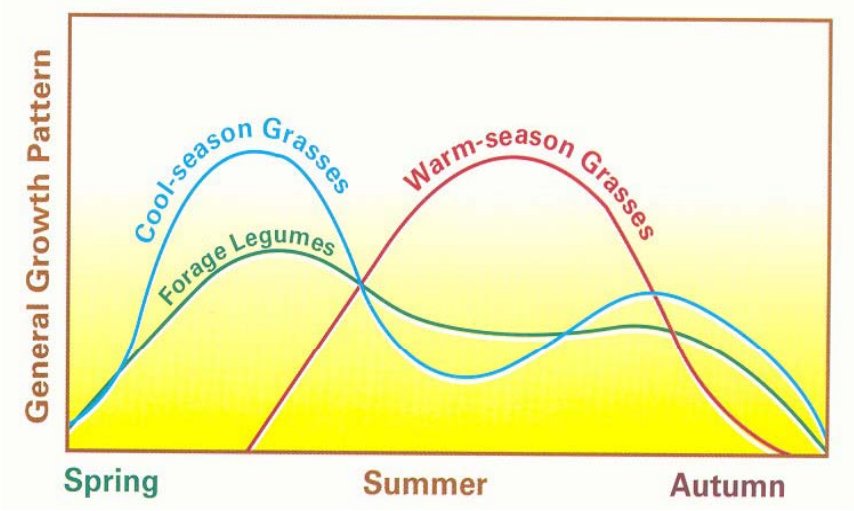
- Close to 90% of the pastures in MS are under continuous grazing.
  - Over 50% of the forage production is underutilized.

## Successful Livestock Production

- There are many important ingredients in a successful livestock production system.
  - One of the most important tasks is to keep detailed records on livestock stocking rate, livestock performance, and forage production.



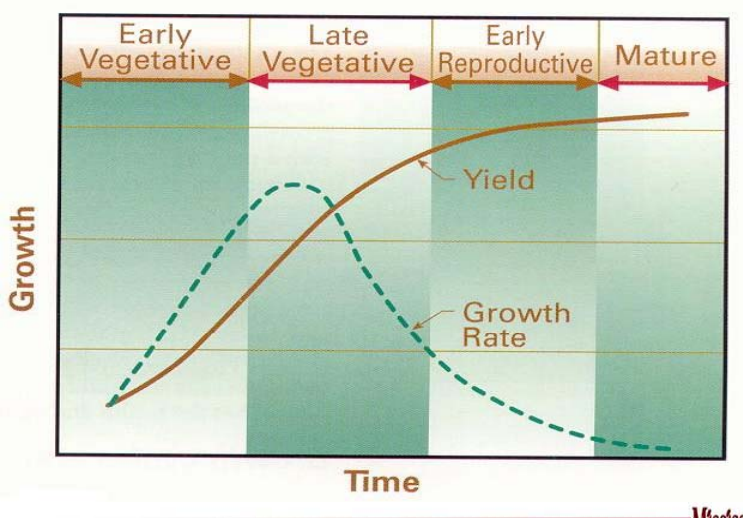

## Forage Species



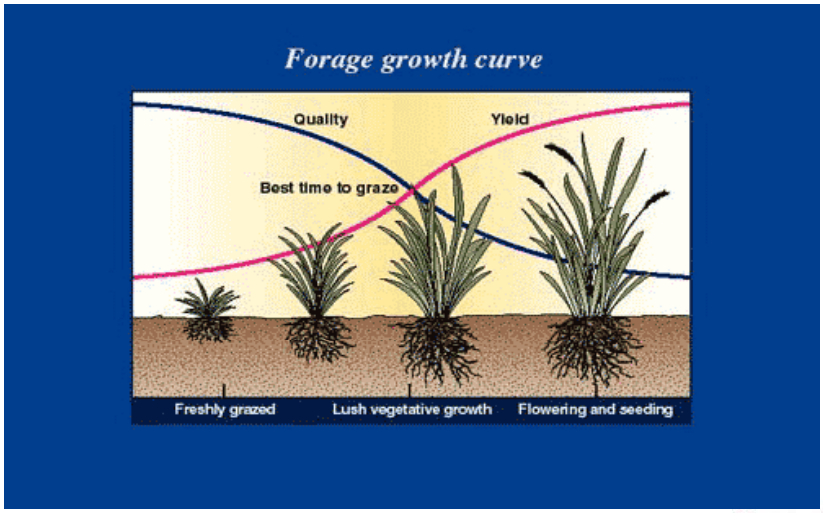
## Changes in Productivity

- Forage utilization rates:
  - Continuous grazing: ~30 to 35%.
  - Rotational grazing: ~50 and 75%.
- Rates are higher in rotational grazing because of higher stock densities.

## Forage Growth Curve



# Forage Growth Curve




## Suggested Residue Height of Selected Forages for Optimum Animal Performance and Stand Persistence

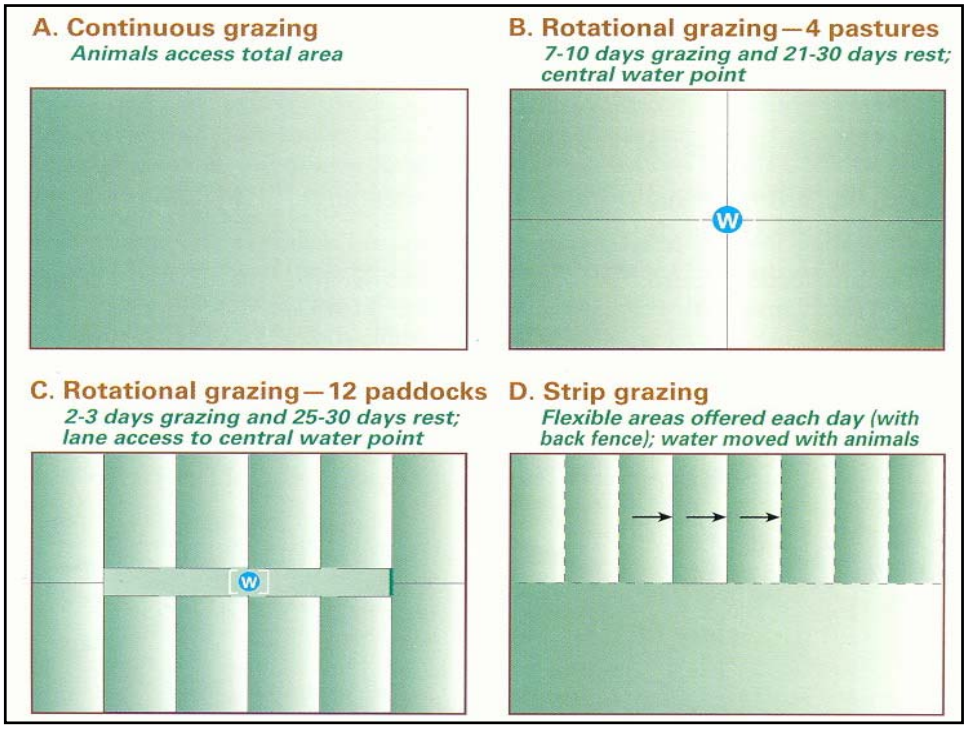
| Species | Residue Height (inches) | Rest Period (days) | Maximum Utilization (%) |
|---|---|---|---|
| Alfalfa | 3 – 6 | 15 – 30 | 50 |
| Annual Ryegrass | 3 – 4 | 7 – 15 | 75 |
| Arrowleaf Clover | 3 – 4 | 10 - 20 | 50 |
| Bahiagrass | 4 – 6 | 10 - 20 | 60 |
| Bermudagrass | 3 – 4 | 7 - 15 | 75 |
| Oat | 4 – 6 | 7 – 15 | 75 |
| Red Clover | 4 – 6 | 10 – 20 | 50 |
| Rye | 4 – 6 | 7 – 15 | 75 |
| Tall Fescue | 3 – 4 | 15 - 30 | 75 |
| Wheat | 4 – 6 | 7 – 15 | 75 |
| White Clover | 4 – 6 | 7 – 15 | 75 |

## Manage Forage Growth

- Decisions about moving animals from paddock to paddock are based on:
  - The amount of forage available.
  - Size of paddocks.
  - Estimated seasonal growth rates.
  - The number and nutritional needs of the livestock.

## Grazing Management Systems

- Grazing management should:
  - Balance livestock demand with forage availability.
  - Promote rapid pasture re-growth during the grazing season.
  - Promote long-term pasture persistence.
- The art of grazing management is to ensure that there is sufficient pasture in a stage suitable to graze at all times throughout the grazing season.




# Continuous Grazing

- **Meaning:**
  - Putting a set number of animals out on a pasture and leaving them there for as much of the season as the pasture will support them.
  - The number of animals the pasture can support is determined by the forage yield during the period of poorest pasture productivity, usually July and August.
  - The stocking rate needs to be very low or the animals will lose weight during the summer.

## Continuous Grazing

- **Drawbacks**
  - Meat or milk production per acre is very low.
  - Most of the forage produced in the spring is wasted.
  - The animals selectively graze and cause the pasture to become less productive with time.
  - Add or subtract animals as determined by pasture productivity.

## Setting Up A Rotational Grazing System

- **Goals**
  - Are you grazing to maintain a herd or achieve maximum production?
  - How intensive do you want your management to be?
  - Are you willing to fertilize?
  - Do you want productive yields right way or can you gradually work up to higher yields?
  - Do you have severe weeds problems that need attention before you intensify your system?

## Setting Up A Rotational Grazing System

- **Resources:**
  - How much capital is available to invest for starting a grazing system?
  - Do I have a shortage or abundance of pasture?
  - What forage species are currently in the pasture?
  - What are the conditions of the pastures?
  - Is water available to each paddock?
  - What are the fencing conditions?

## Why Rotational Grazing?

- Only one portion of the pasture (paddock) is grazed while the remainder of the pasture "rest".
  - Allow forage plants to renew energy reserves, rebuild vigor, deepen their root system, and give long-term maximum production.
- Time Savings
  - It takes about 15 – 20 minutes per day to move cattle if fence is properly placed.
  - It takes about 20 minutes to 1 hr to feed hay or silage.
  - It takes about 7 hours per acre to make hay.

# Advantages

- The advantages of controlled grazing are:
  - More of the produced forage is used.
  - Higher numbers of animals can be supported by the pasture.
  - More meat or milk is produced per unit of land.
  - The pasture recovers quickly after being grazed and remains productive for a longer period of time.
  - It favors taking a hay or silage cut if there is an excess of forage in the spring.
  - Desirable legumes and grasses are able to persist from year to year.

# Rotational Grazing

- Rotational grazing involves fencing a pasture into several small paddocks.
  - Subdivision is a useful way to balance livestock needs with forage supply.
  - Put livestock into a paddock when the forage is 8 -12 inches and remove livestock when the pasture is grazed down to 3 inches.
- A relatively high stocking rate for the size of the paddock forces the animals to be less selective in their grazing and to graze the paddock off evenly.

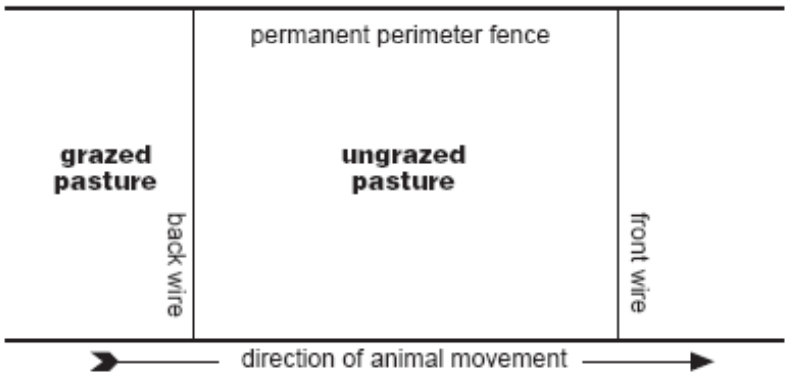
# Rotational Grazing

- Dividing the fields allows some of the paddocks to be harvested for hay early in the season.
  - Consider how much will be needed to support the livestock until the hay aftermath is ready to be grazed.
  - The later the first cut, the slower the regrowth.
  - This delays putting the cut area back into pasture rotation and puts extra pressure on the grazed area.
- Rotational grazing does not necessarily increase daily live weight gains, but does allow a heavier stocking rate to be carried, which increases gains per acre.

# Strip Grazing

- In this system the animals are given just enough pasture to supply 1/2 to 1 day's requirements.
- The fence is moved once or twice daily to provide fresh forage.
  - A second wire can "follow" the animals to prevent movement back onto grazed areas.
- While this is the most labor intensive method of grazing.
  - It results in the highest quality feed, the least waste and least damage to a pasture.

# Strip Grazing




# Mob Grazing

- **Ultra High Stock Density**
- Grazing by a relatively large number of animals at a high stocking density for a short time period and are left in a paddock until all the forage is grazed down evenly and closely.
- This approach is normally used to clean up pastures with a lot of coarse, mature plants. Mob grazing can replace clipping.

# Mob Grazing

- **The Advantages of Many Paddocks**
  - As paddock size decreases stock density increases, causing better distribution of dung, urine, and trampling.
- **More Even Grazing**
  - The longer we hold any number of animals in any paddock, the higher the number of plants that get severely grazed.

# Mob Grazing

- **Increased Energy Flow**
  - The amount of green leaf removed greatly affects the rate which plants re-grow after being grazed.
- **Improved Animal Nutrition**
  - The fact that animals move more frequently onto fresh ground, means they receive a better nutrition and reduced danger of parasite infection and buildup.

## Mob Grazing

- 1,000,000 pounds of cattle per acre stock density.

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- 400 head in 1.5 acres per day.

# Mixed Grazing

- This approach to grazing management takes advantage of the fact that different types of livestock like to graze different plants.
- Two or more types of animals graze the paddock at the same time or follow one another through the paddocks.
  - Sheep and cattle make a good combination.
  - Do not graze sheep with horses.

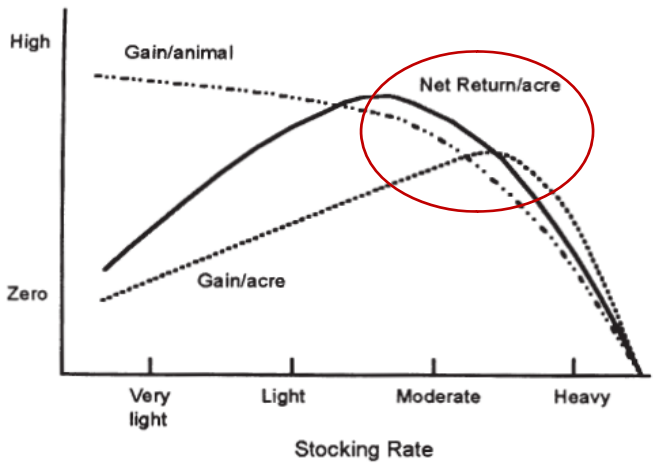



Figure 5. Influence of stocking rate on individual animal performance, gain per acre, and net return per acre.

## Stocking Rate and Carrying Capacity

- Stocking rate is generally expressed as animal units per unit of land area.
- Carrying capacity is the stocking rate that is sustainable over time per unit of land area.
- A critical factor to evaluate is how well the stocking rate agrees with the carrying capacity of the land.
  - A term that is used to help understand and estimate forage requirements is the concept of **Animal Unit (AU).**

## Animal Unit (AU)

| *Concept* | *Abbreviation* | *Definition* |
|---|---|---|
| Animal unit | AU | 1,000 lb. cow with calf |
| Animal unit day | AUD | 26 lbs. of dry forage |
| Animal unit month | AUM | 780 lbs. of dry forage |
| Animal unit year | AUY | 9,360 lbs. of dry forage |

# Animal Unit (AU)

| *Animal type* | *AUE* | *DM demand (lbs. per day)* |
|---|---|---|
| Cattle | | |
| Calves | | |
| 300 lbs. | 0.4 | 9 |
| 400 lbs. | 0.5 | 12 |
| 500 lbs. | 0.6 | 15 |
| 600 lbs. | 0.7 | 18 |
| Cows | 1.0 | 26 |
| Bulls | 1.25 | 32 |
| Horses | 1.25 | 32 |
| Sheep | 0.2 | 5 |
| Goats | 0.17 | 4 |
| White-tailed deer | 0.17 | 4 |

# Stocking Rate Calculation

- A livestock producer has 50 head of 1,000-lb cows on 200 acres for 12 months.

**Total Land Area ÷ [(#AUs) x (Grazing Season)]**

**200 acres ÷ [(50AUs) x (12 months)]**

**= 0.33 acres per AU month (AUM) or 4 acres per AU year (AUY)**

## Example of Stocking Rate

- Livestock operation that has 100 acres of bermudagrass and long-term production records indicate the pasture is capable of producing 5,000 lbs. of forage DM per acre over the growing season.
- A producer may wish to know how many head of 500 lb. stocker calves they may expect to stock in the pasture.

## Calculating Available Forage for Grazing

**(Average DM in lbs. per acre) x (# Acres) x (% Utilization Factor)**

**5,000 x 100 x 0.65 =**

**325,000 lbs. of Forage DM**

## Calculating Stocking Rate (# head) Based on Available Forage

(Total Forage DM) ÷ [(# Grazing Days) x (Daily Forage Demand for 1 AU or AUE of the animal in question)] = # of Head

325,000 ÷ [(120 days) x (15 lbs. DM per day)] = Stocking Rate

325,000 ÷ 1800 = 181 Head

## Calculation of AUs from AUEs

# Head x AUE = Total AUs

181 Head x 0.6 = 109 AUs

Calculate the stocking rate.

(Total Land Area) ÷ (# AUs)= Stocking Rate

100 ÷ 109 = 0.92 acres per AU

# Grazing System Infrastructure

- Requirements:
  - Paddock size and shape
    - Square or rectangular
  - Water
    - Close to animals much better
  - Fencing
    - Electric fencing
      - Polytape or polywire
      - High-tensile

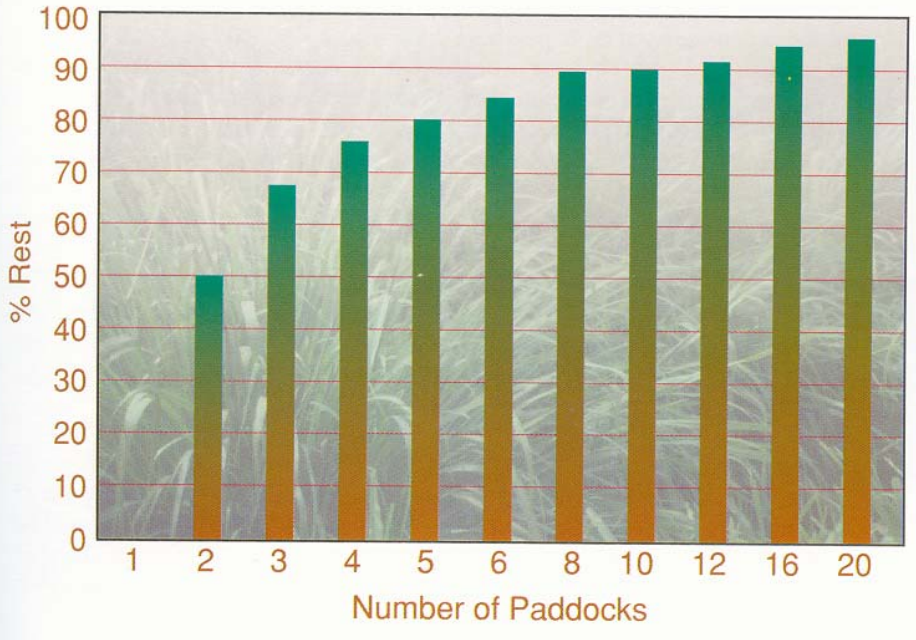
# Paddocks: How Many and How Big?

- Depends on the manager
  - Determined by current fencing, topography, access to water, and access to common areas (corral).
  - The number of paddocks depend on the number of days the animals graze in a paddock and the maximum summer rest period needed.
- More paddocks mean increasing the length on the rest period and decreasing the length of time an area is grazed.
  - Rest periods should be based on the growth rate of the pasture, which will vary with the season and weather conditions

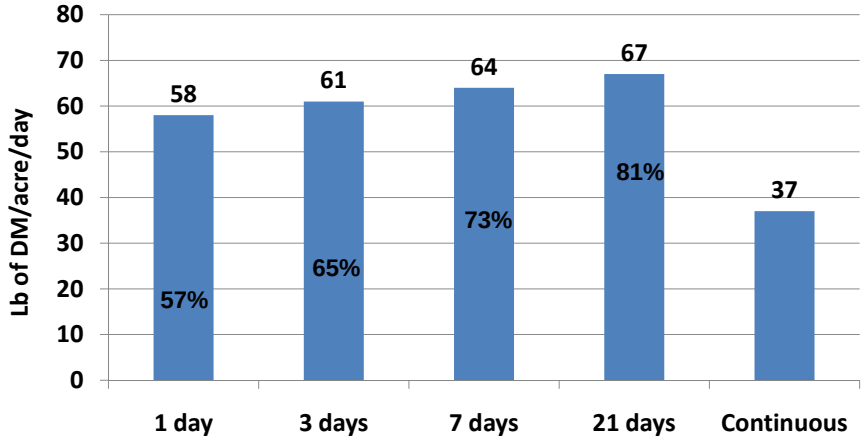
# Length of Rest Periods

- Use short grazing periods
  - More uniform forage intake
    - One day for dairy.
    - Two to six days for cattle.
- Shortening grazing periods:
  - Three to seven days increases utilization to 50 to 65 percent.
  - Two days, 55 to 70 percent.
  - One day, between 60 and 75 percent.

*Figure 19*
The relationship between number of paddocks and amount of rest.



## Bahiagrass Forage Production



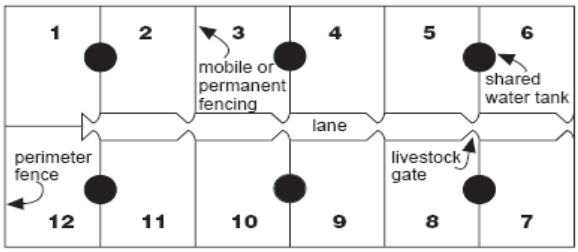

Source: Stewart et al., 2005

## Relationship Between Paddock Number and Rest Period Per Acre

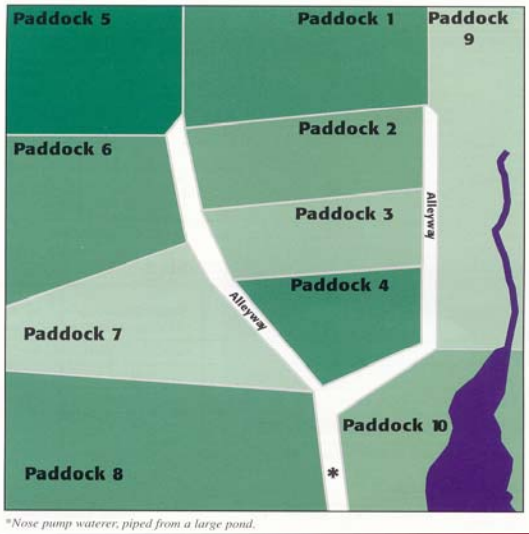

- In a 6-paddock system, animals will graze a single paddock for about 5 to 6 days, allowing the paddock to rest 82% of the time.

# Paddock Layout

- Rectangular or square
  - Easier calculation of the amount of fence needed.
  - Square pastures require less fence.
  - Rectangular pastures can be used for strip-grazing




# Paddock Layout




*Nose pump waterer, piped from a large pond.

# Where Should I Start?

- One should consider starting with five to 10 paddocks in the rotational grazing program. This allow a paddock to be grazed in three to 7 days and rested for 25 to 30 days.

- Example
  - 100 heads of stocker calves weighing 500 lbs each.
  - Dry matter production 2000lb/ac.
  - Forage Utilization = 60%.
  - Dry matter intake = 3%.

# Calculations

$$\text{Number of paddocks} = \frac{\text{days of rest}}{\text{days of grazing}} + 1$$

Example:

$$\text{Number of paddocks} = \frac{28 \text{ days rest}}{4 \text{ days grazing}} + 1$$

= 8 paddocks

Acres required per paddock =

$$\frac{\text{weight x \% DMI x number x days per paddock}}{\text{DM per acre x \% utilization}}$$

Example:

Acres required per paddock =

$$\frac{500 \text{ lb x 3\% x 100 head x 4 days}}{2{,}000 \text{ lb per acre x 60\%}}$$

= 5 acres

Total acres required per grazing cycle =

number of paddocks x acres required per paddock

Example:

Total acres required per grazing cycle =

8 paddocks x 5 acres per paddock

= 40 acres

$$\text{Stocking rate} = \frac{\text{number of animals to be grazed}}{\text{total acres grazed}}$$

Example:

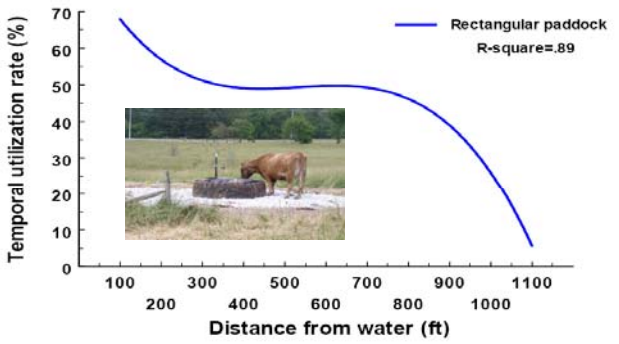
$$\text{Stocking rate} = \frac{100 \text{ head}}{40 \text{ acres}}$$

= 2.5 head per acre

# Water Systems

- Providing water is another capital.

Figure 1. Impact of distance from water on temporal utilization rate in rectangular 10 acre paddocks.




# Water Systems

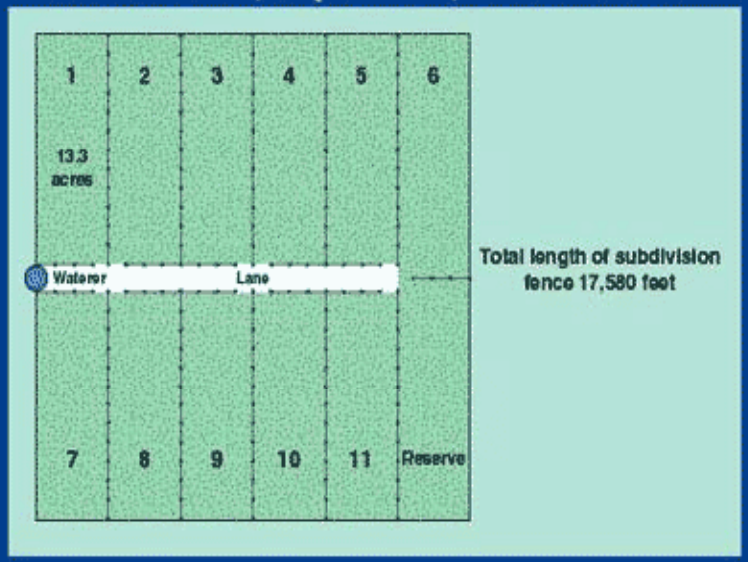
- Designing a water system for future expansion may be the best option for beginners with limited funds.
  - Many producers use pipes and portable waterers to create movable water systems and design permanent systems based on this experience.
- Flexibility in locating water within paddocks should be part of any final design.

# Fencing

- Rotational grazing requires additional fencing.
- High-tensile electric fencing is cheaper and easier to install than conventional fencing.

- Temporary as well as permanent electric fencing is available, and many producers use a combination of the two.
  - This equipment offers flexibility in managing animal and plant resources.

*160-acre tract, 12 paddocks, 13.3 acres each*



## Alleys and Gates

- Lane should be kept as narrow as possible
  - Six to eight feet for cattle
  - 14 to 18 feet for cattle and machinery
  - They should be short
- Gates should be located in the corner of the paddock closest to the common area (corral).

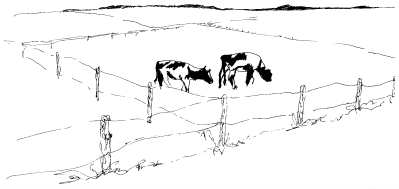
## Fertilization and Rotational Grazing

- Rotational Grazing increases the nitrogen value of manure returned to the pasture by grazing animals.
  - As much as 85 to 90% of the nutrients consumed in the forage are re-deposited on the pasture.
  - Producer can reduce recommended nitrogen rates 20% for the same yield goal on intensively managed pastures.
  - Fertilize **only** when increased forage production is needed.

# Nutrient Removal

Table 2. Nutrients removed by different forage management alternatives.

| Nutrient | Nutrients (lbs./acre) removed to produce 500 lbs. beef/acre | Nutrients (lbs./acre) removed to produce 6 tons of hay/acre |
|---|---|---|
| Nitrogen | 18 | 300 |
| Phosphorus | 9 | 60 |
| Potassium | 1 | 240 |

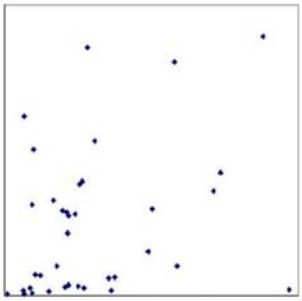


# Grazing System and N Cycling

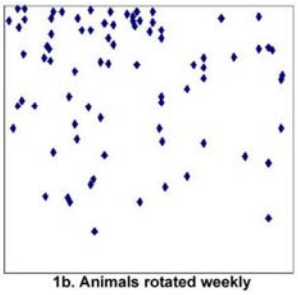
- Urine has the N-fertilizer equivalent of 200-1,000 lbs N/acre in that little patch.
- Continuous
  - The effective N application rate from cattle urine is less than 1 lb/acre/day.
- Rotational
  - The effective N-fertilizer equivalent from urine is around 30- 50 lbs/acre/day
  - A twice-weekly rotation puts about 20 lbs/acre of readily available urinary N on the pasture.

# Nutrient Distribution

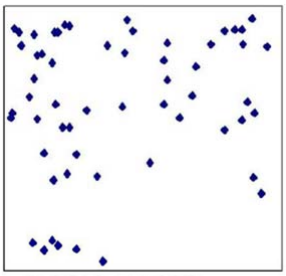
Dubeux et al. (2005)



1c. Continuous grazing



1b. Animals rotated weekly



1a. Animals rotated daily

Table 1. Continuous Grazing Scenario

| Continuous Grazing | April - September |
|---|---|
| Total Acres | 80 |
| Number of Head | 80 |
| ADG (lbs) | 1.5 |
| In Weight (lbs) | 500 |
| Out Weight (lbs) | 750 |
| Days on Pasture | 167 |
| Pounds Gain per Acre | 250 |

Table 2. Rotational Grazing Scenario

| Rotational Grazing | April – July | July – October |
|---|---|---|
| Total Acres | 80 | 80 |
| Number of Paddocks | 8 | 8 |
| Acres per Paddock | 10 | 10 |
| *Stocking Rate (head per acre) | 2 | 1.13 |
| **Stocking Density (head per acre) | 16 | 9 |
| Days Grazing per Paddock | 4 | 4 |
| Days Rest Period per Paddock | 28 | 28 |
| Number of Head | 160 | 90 |
| Average Daily Gain (lbs) | 2 | 1.25 |
| In Weight (lbs) | 500 | 700 |
| Out Weight (lbs) | 700 | 825 |
| Days on Pasture | 100 | 100 |
| Pounds Gain per Acre | 400 | 141 |

*Stocking rate refers to number of head / total acres
**Stocking density refers to number of head / acres per paddock

# Summary

- Management-intensive grazing is not for every producer.
- It will not instantly provide wealth and leisure or solve all the problems livestock producers face.
- It might take three years of observation and manipulation of soil, plant, and animal resources to really begin to manage them well.

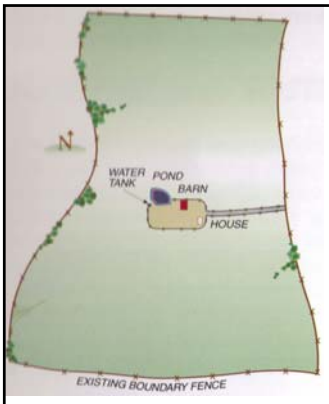
## Four Steps to Rotational Grazing

- Determine the number of animal units that will be in the grazing system.
- Estimate how many acres will be needed throughout the grazing season.
- Estimate how large each paddock should be.
- Estimate the number of paddocks needed.

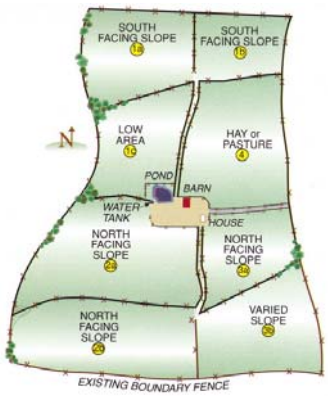
## Rotational Grazing Systems

- **Profits improve because:**
  - The stocking rate is higher.
  - The grazing season is longer.
  - There is less need for land dedicated to “hay production only.”
  - There is less dependence on mechanical equipment.
  - Animal health improves.

## Progressive Changes in Forage Management








Develop a 3 – 4 year plan depending on economics, land resources, forage species, and goal of the operation.

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## Take Home Message

- Rotational grazing allows your pastures to stay green, which is healthier for your pastures and your livestock. As a bonus, you should see a decrease in your feed bill as well and well as the amount of hay being fed.

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Thank
You