

Grazing Management Principles and Applications



Katie Mason, PhD

June 14, 2021

Central Region Grazing School Agent In-Service Training

Outline

Goals of grazing management

Balance between plant and animal

Grazing methods and efficiency

Designing your grazing plan

Take home message

GOALS OF GRAZING MANAGEMENT

Overall Goal

Efficient production and utilization of a forage base that is able to meet the needs of the livestock herd.

Can be achieved through:

Implementing **grazing methods** within a grazing system

Grazing Management: Objectives

1. To manage the pasture and other feed inputs to efficiently produce animal products
2. To effectively managing ***forage quantity*** and ***quality*** over the grazing season, regardless of grazing method utilized
3. To adjust livestock stocking rates to improve grazing efficiency and animal production per unit of land

Natural Laws of Grazing Management

1. Keep down the shoot, kill the root

- Greater than 50% leaf removal = greater than 50% of root growth stopped

2. Nature does not like bare spots

- Runoff, erosion, undesirable species encroachment

3. Bare soils decrease moisture availability

- Runoff, decreased soil OM, high soil surface temps

4. If given a chance, nature would like to bring back best-adapted plants

- Under proper soil conditions and planned grazing

BALANCE BETWEEN PLANT AND ANIMAL



Plant

Forages are unique as far as “crop management”

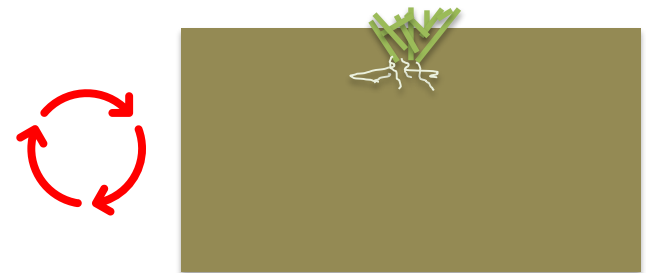
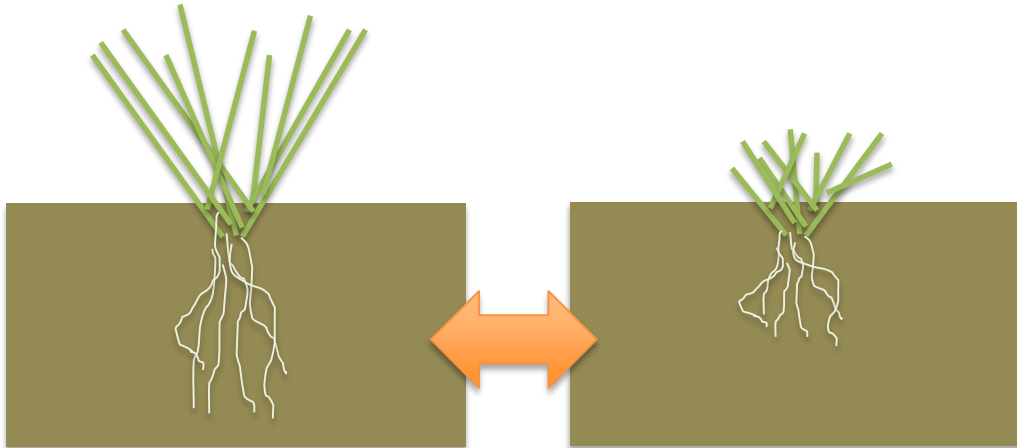
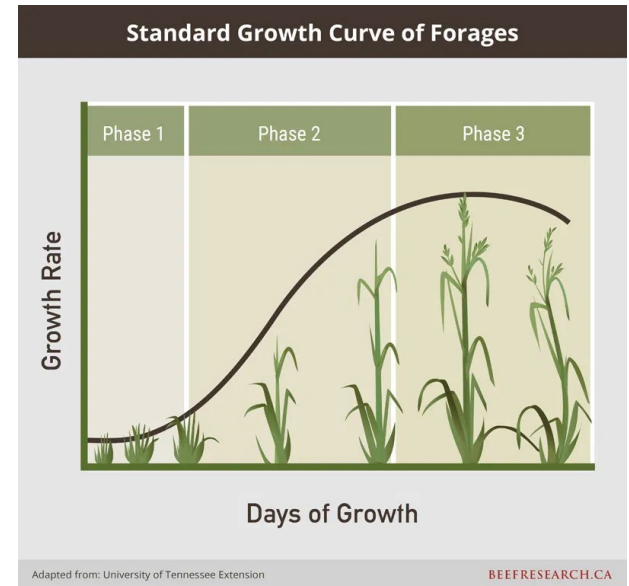
Cattle farmers are grass farmers first!

Animal



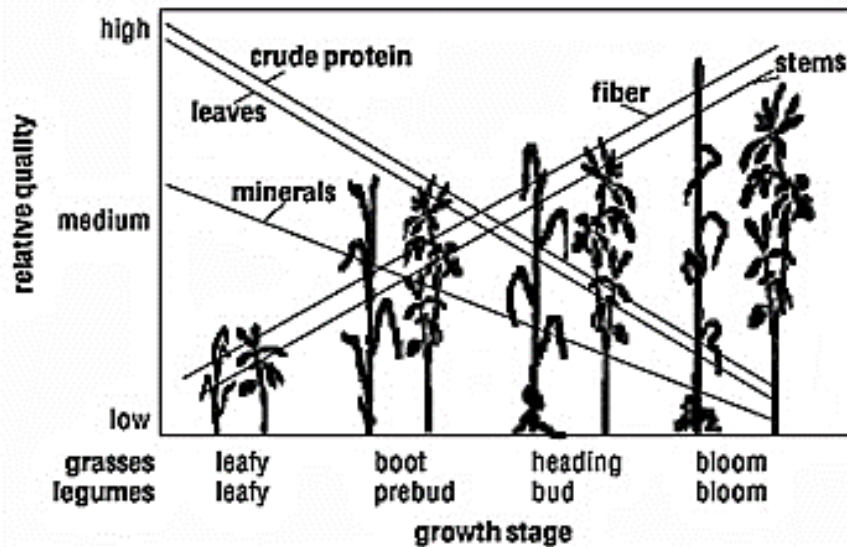
The Plant

- Plants should remain in the vegetative growth stage as much as possible
 - Leaves are like “solar panels”
- Maintenance of root reserves (carbohydrates) will ensure longevity of the plant



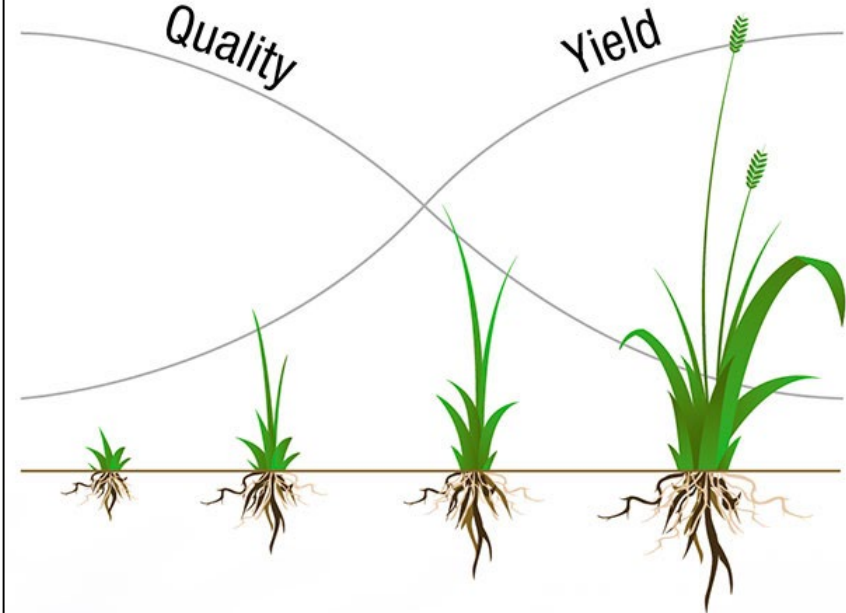
Optimize quality and yield

Effect of plant maturity on forage intake and digestibility



Source: Adapted from Blaser, R., R.C. Hammes, Jr., J.P. Fontenot, H.T. Bryant, C.E. Polan, D.D. Wolf, F.S. McClaugherty, R.G. Klein, and J.S. Moore. 1986. Forage-animal management systems. Virginia Polytechnic Institute, Bulletin 86-7.

FIGURE 1 Interaction of forage quality and yield



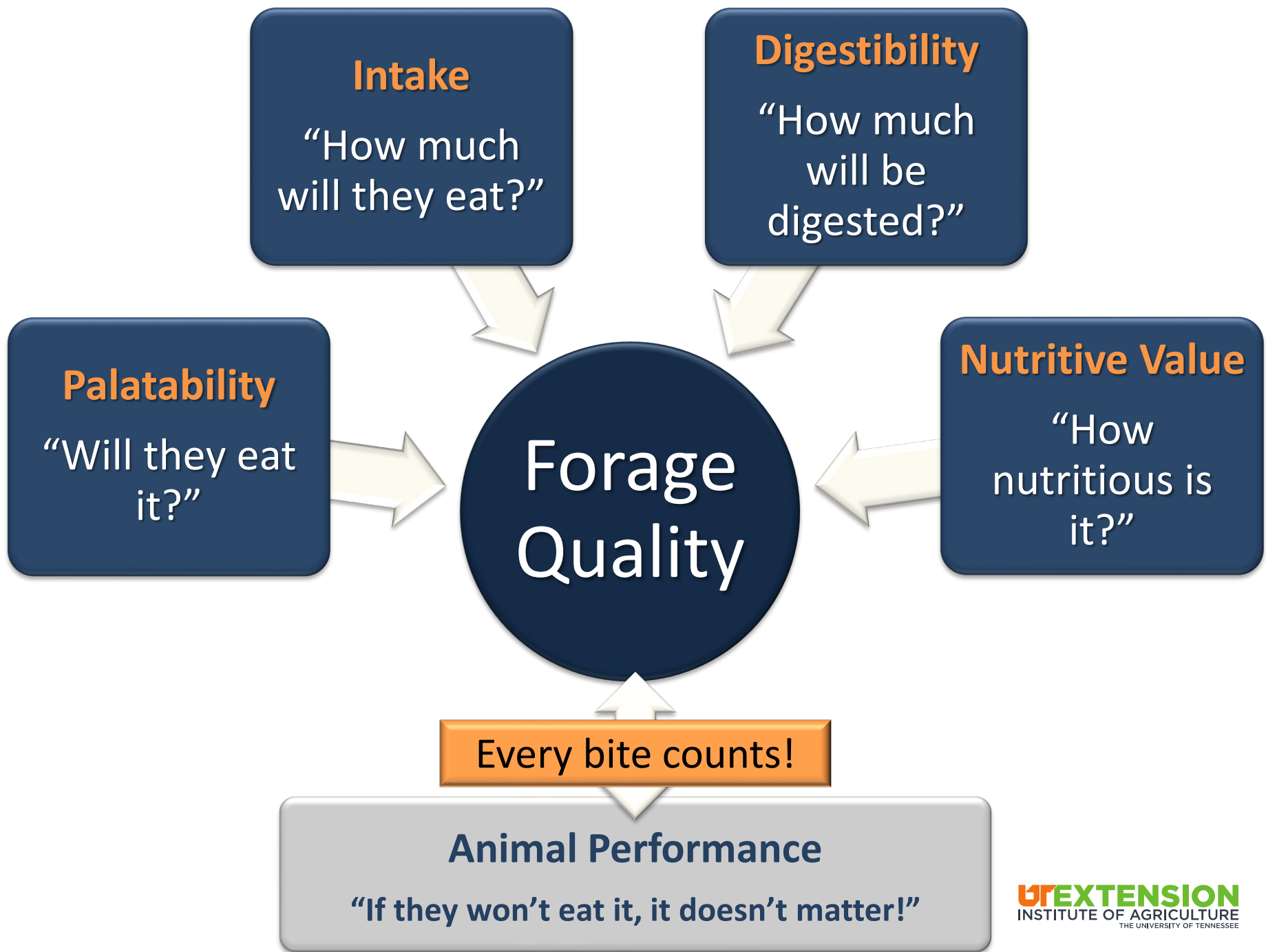
Source: University of Minnesota Extension

Forage Quality: Bag Demo

The Animal

- Must meet daily nutrient intake requirement
 - A cow may eat up to 20% of her body weight in fresh forage per day
 - For a 1200 lb cow, that's 240 lb of grass!
 - Palatability, digestibility, and nutritive value

Animal Class	Forage Consumption, % of BW
Beef cow (dry)	2.0 – 2.5
Beef cow with calf	2.4 – 2.6
Heifer, replacement	2.5 – 3.0
Stocker	2.5 – 3.5



Intake and Forage Quality are Related

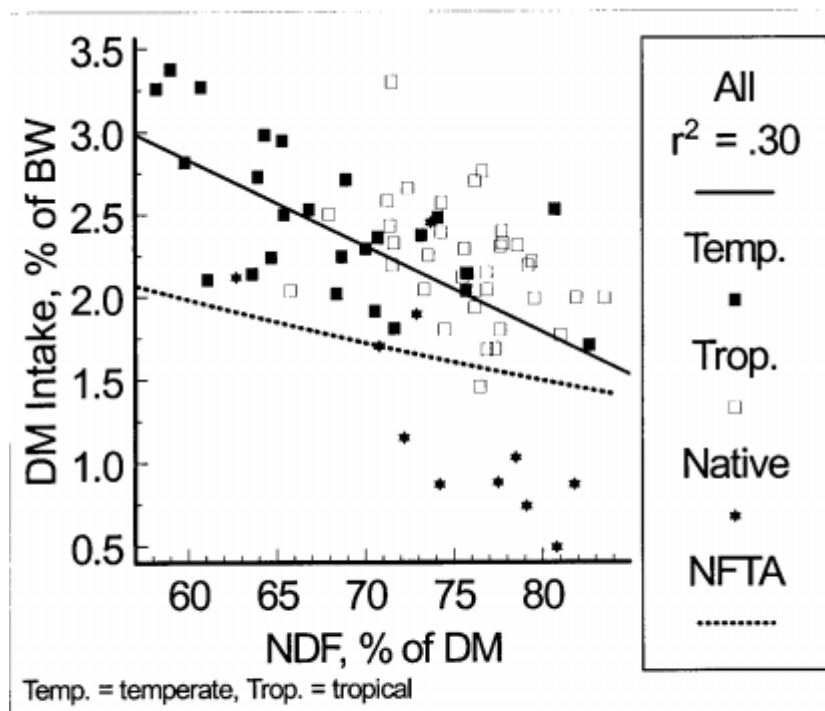






Figure 2. Observed DM intake vs NDF concentration for 73 grass hays, and NFTA estimates of DM intake (Moore et al., 1999b).

Fiber Fractions

- NDF – Related to intake
 - $\text{DMI (\% of BW)} = 120/\text{NDF \%}$
 -  intake,  NDF
- ADF – Related to digestibility
 -  digestibility,  ADF
- Lignin – 100% Indigestible

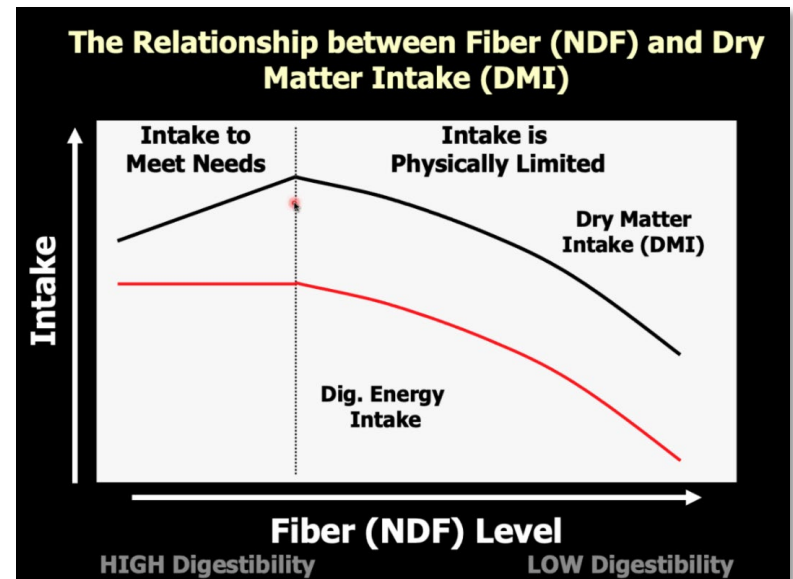


Figure: L. Stewart, UGA

Intake – Grazed Tall Fescue

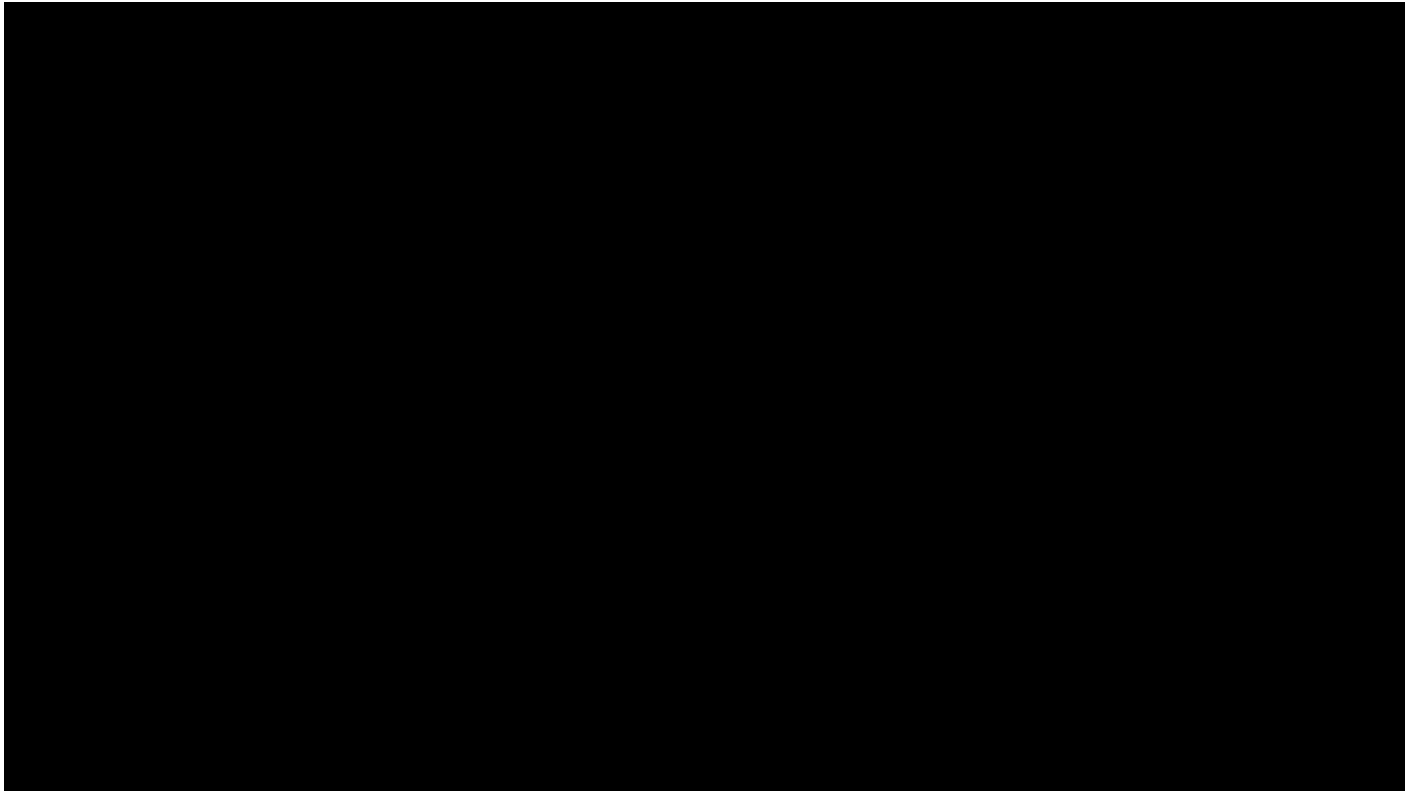
150 d
grazing

	High Quality (+ Legumes, Mowed periodically)	Low Quality (Mowed once)
Intake, lb/hd/d	24 a	18 b
Digestible DM Intake, lb/hd/d	14 a	11 b
Cow Weight, Final	1070 a	1015 b
Calf Weaning Weight	508 a	470 b

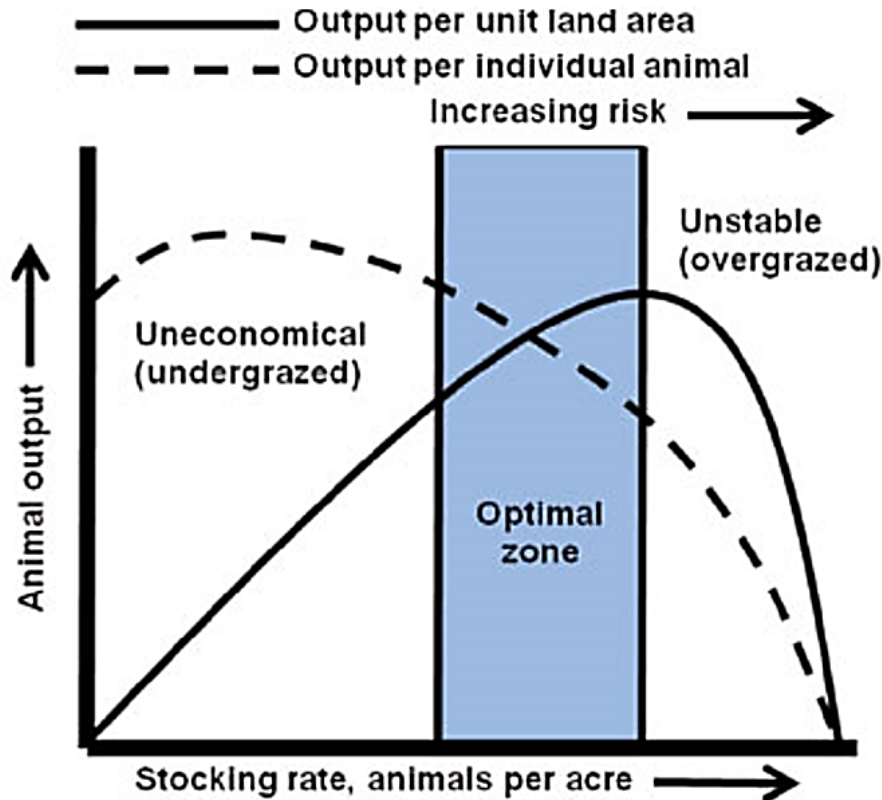
Holloway et al., 1979

The Animal

- Must be able to access the forage
Think of how a cow uses her tongue to tear leaves off of the plant



Stocking Rate



There has to be a compromise between a number of animals and forage availability

Forage Availability



I don't want to see their feet!

GRAZING METHODS AND EFFICIENCY

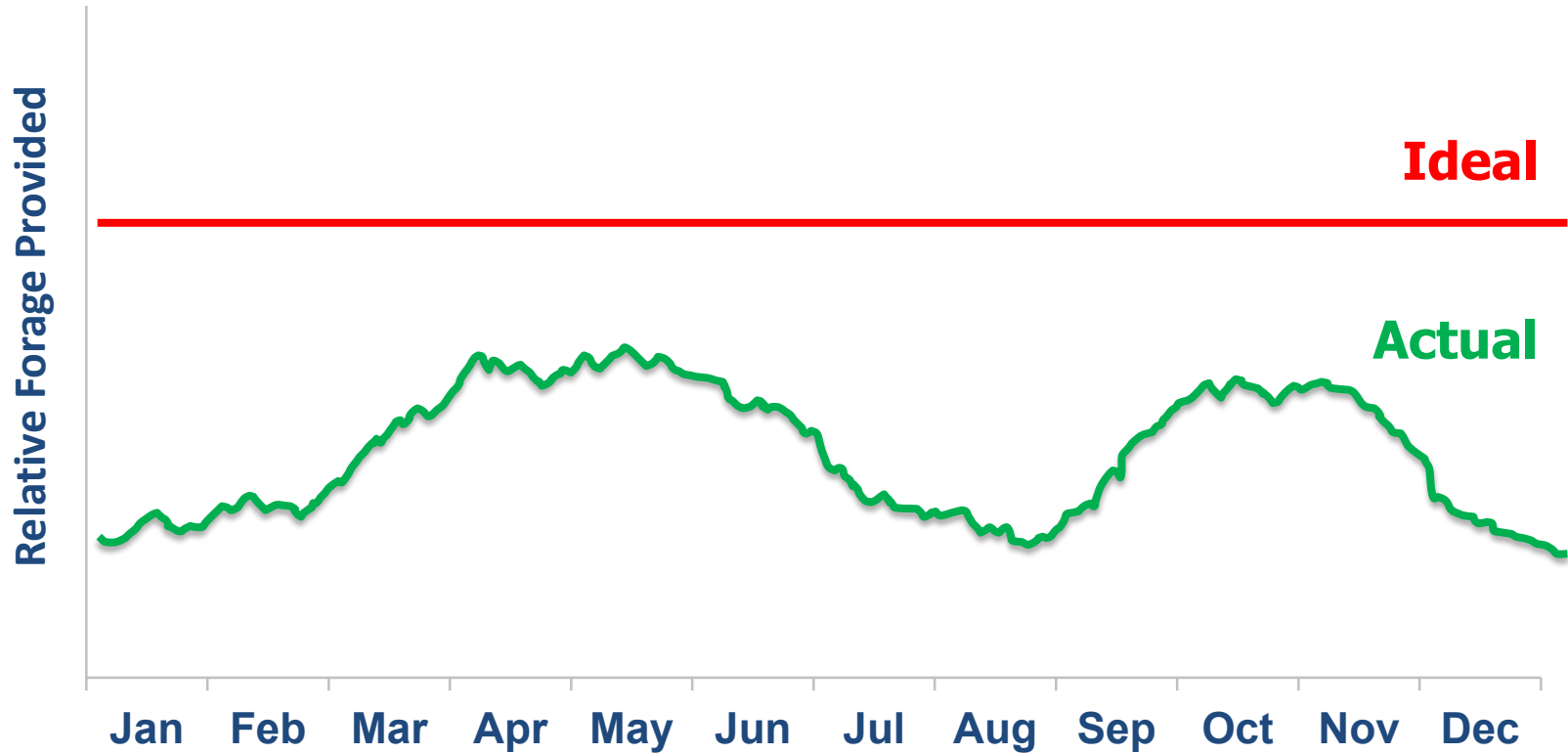
Grazing Methods: Goals

1. Improved grazing efficiency
2. Reduce pasture waste
3. Conserve surplus forage (hay or silage)
4. Increased animal performance
5. Improved forage quality at time of use

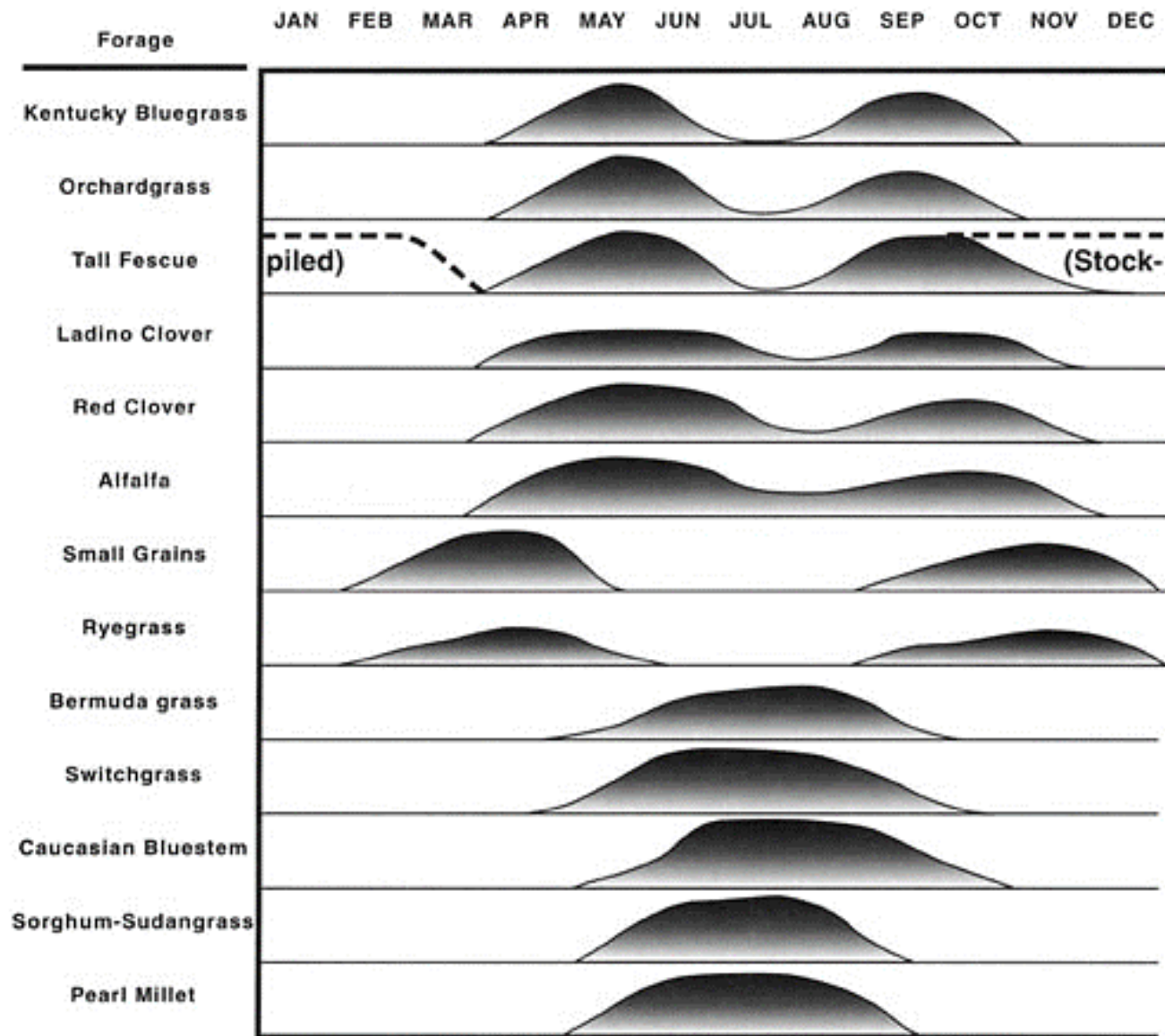
Efficiencies of Grazing Methods

Grazing Methods	Efficiency
Continuous Stocking	30-40%
Slow Rotation (3-4 paddocks)	50-60%
Moderate Rotation (6-8 paddocks)	60-70%
Strip Grazing	70-80%

Forage Distribution



Can we
graze
year-
round?

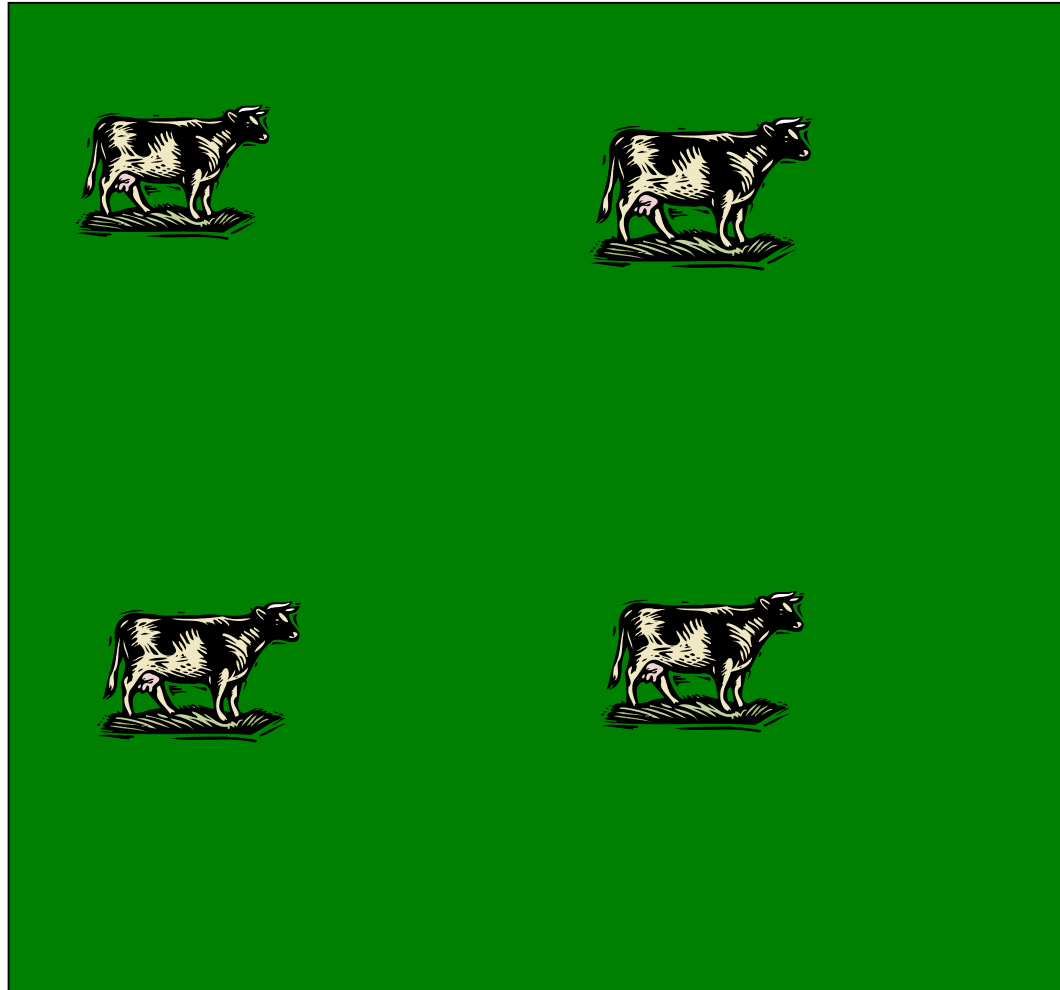


Continuous Stocking

- Simplest, most commonly used in Southeast
- Animals stocked on single pasture unit for duration of grazing season.



Continuous Stocking



Continuous Stocking

Pros

- Simple
- Animals are allowed to selectively graze
- May result in overall high individual animal performance

Cons

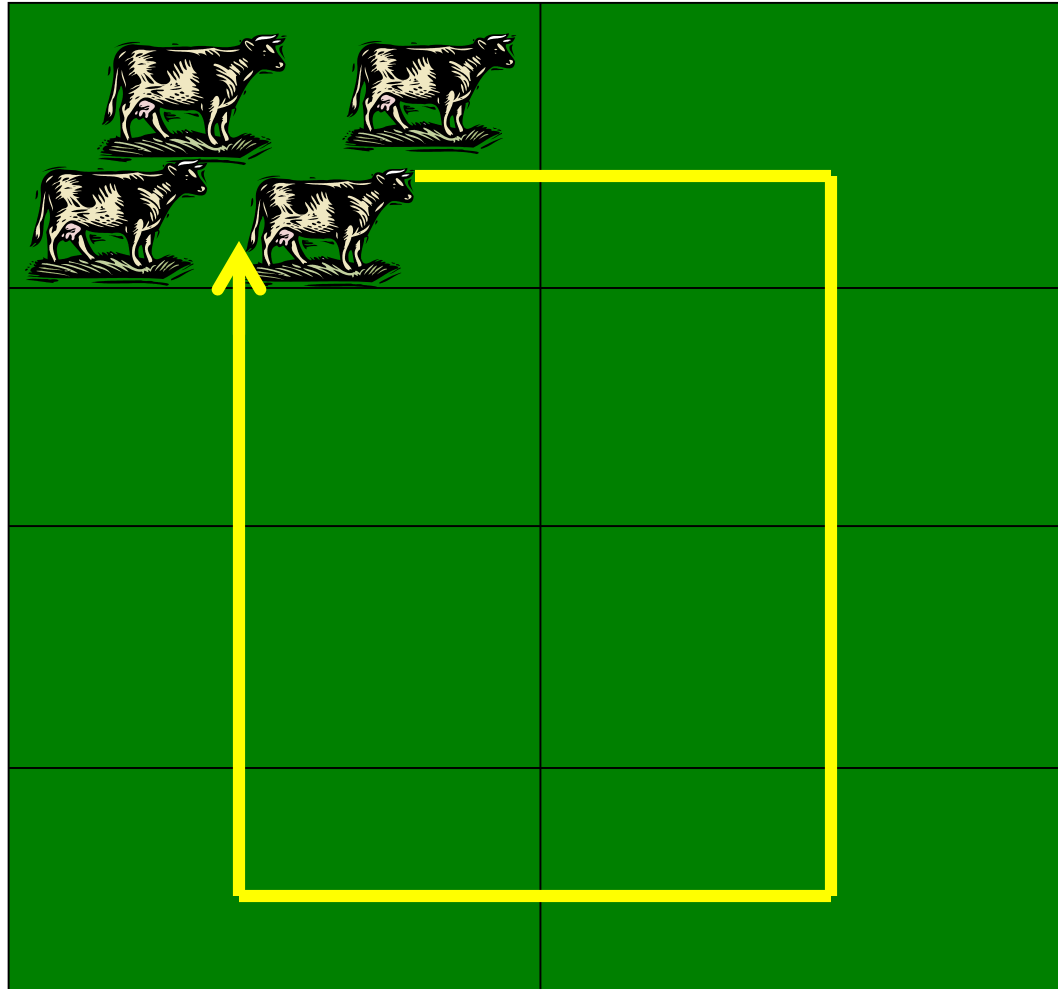
- May lead to overstocking, overgrazing, decreased forage production
- Lowers overall potential for herd performance
- Least efficient

Rotational Stocking

- Grazing system in which the grazing area is divided into several small “paddocks.”
- Animals will rapidly graze plants to a desired height before “rotating” to a new paddock.



Rotational Stocking



Rotational Stocking

Pros

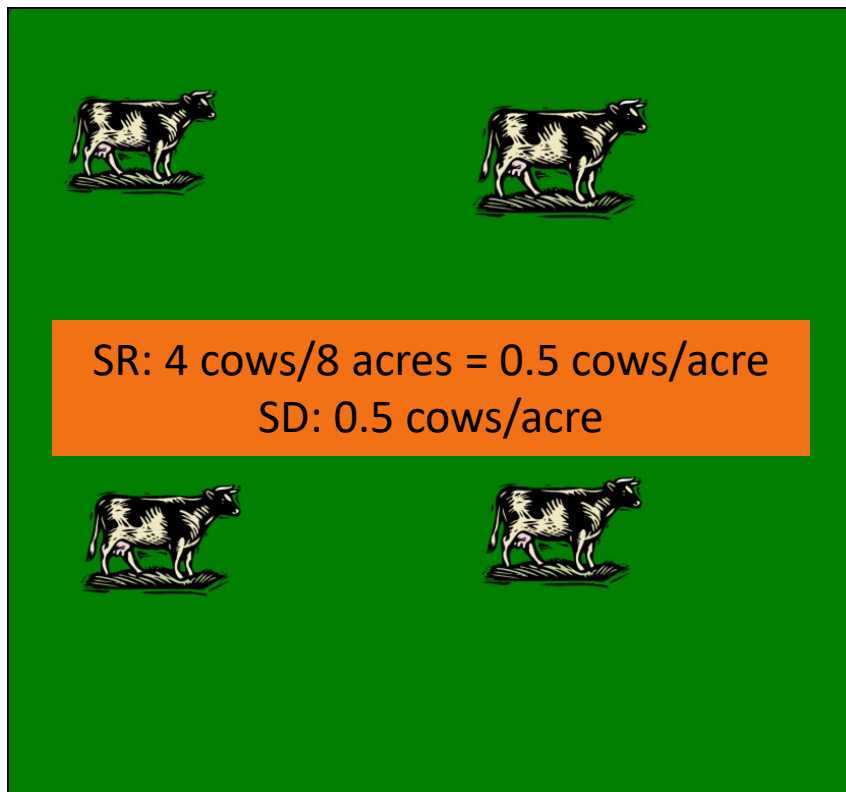
- Potential increase in forage utilization compared to continuous
- Flexibility in managing excess
- Better matching of animal nutrient requirements
- Improved pasture management skills
- Nutrient distribution

Cons

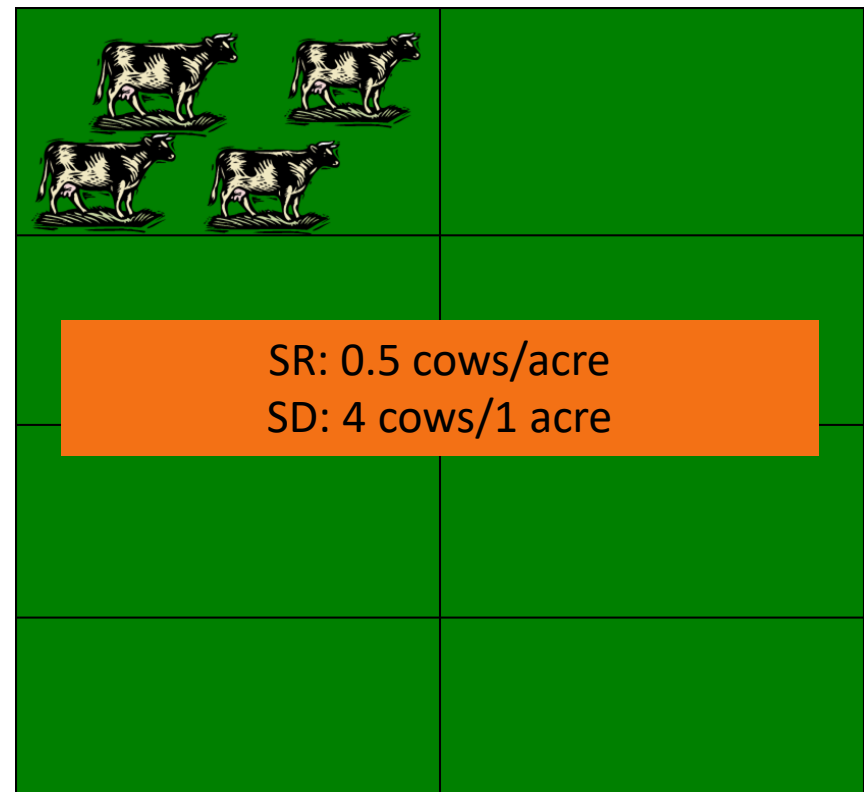
- Initial investment in fences, watering systems
- Labor availability
- More management decisions

A note on stocking rate...

Stocking Rate: Big Picture



Stocking Density: Right Now



Potential Stocking Rates

- Scenario
 - Cow-calf pairs, 1200 lb cow + 300 lb growing calf
 - Cool-season forage system
 - 130 days of grazing
 - Fall-calving

	Forage Utilization Rate			
	20	40	60	80
Forage DM (lb/ac/yr)	Stocking Rate (cow-calf pairs/acre)			
2000	0.1	0.2	0.3	0.4
4000	0.2	0.4	0.6	0.8
6000	0.3	0.6	0.9	1.2
8000	0.4	0.8	1.2	1.6

Adapted from Mullenix & Johnson, Understanding Stocking Rates in Grazing Systems

Continuous vs Rotational

- Compared performance of continuous vs. rotational stocking of mixed grass pastures
- Continuous, 6-paddock rotation, and 11-paddock

What did they find?

Continuous vs Rotational

Table 1. Heifer performance on alfalfa, tall fescue, and orchardgrass pastures under various grazing methods

Grazing Method	Stocking Rate (heifers/ac)	Gain/hectare (lb/ac)
Continuous	1.2 b	119 b
6-Paddock (6 d, rest 30 d)	1.9 a	164 a
11-Paddock (3 d, rest 30 d)	1.6 a	160 ab

Table 2. Average forage composition of pastures under various grazing methods before grazing

	CONT	6-PADD	11-PADD
NDF	68.0 a	57.7 b	58.1 b
ADF	42.7 a	35.8 b	36.6 b
CP	12.2 b	15.2 a	16.6 a

Continuous vs Rotational

- Greater performance and efficiency in the rotationally grazed paddocks compared with continuously grazed
- Adding additional paddocks did not have an advantage... may just be extra labor and resources.

Any amount of rotation is better than continuous grazing... does not have to be incredibly intensive.

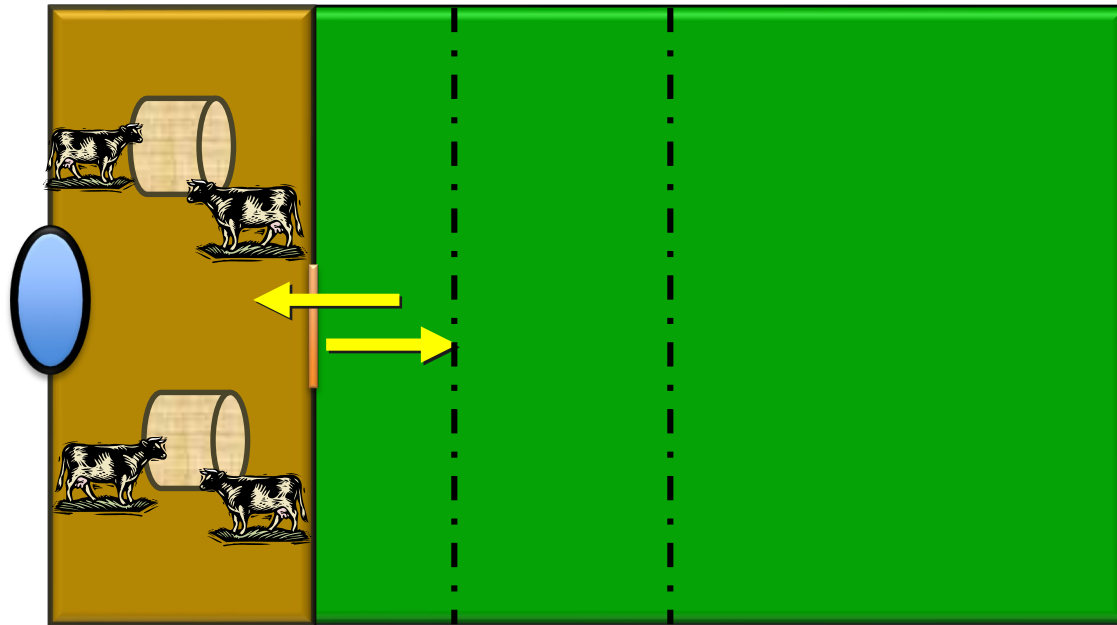
Using High Quality Forage Efficiently

Limit Grazing

- Allow cows access to high quality forage for a few hours per day
- May decrease hay needs in winter systems



Limit Grazing



Arkansas – Limit Grazing

- Free choice bermudagrass/dallisgrass hay and:
 - 1) Corn gluten feed – fed 3x per week
 - 2) Limit grazing – 7 hr/d, 2x per week
 - 3) Limit grazing – 7 hr/d, 3x per week

Stocking **density** = 0.1 acre per cow per day

Arkansas – Limit Grazing

- 0.1 acre per cow per day
- 2 days per week

30 cows x 0.1 acre per cow per day = 3 acres for
each limit grazing event

3 acres x 2 days per week = 6 acres

12 acres – come back to the same area every 2 wk

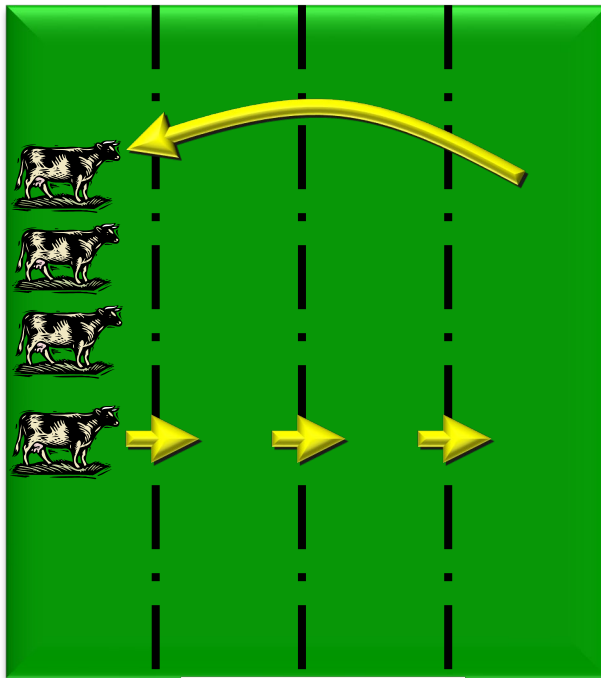
Arkansas – Limit Grazing

- What did they find?
 - Cows limit grazed maintained similar BCS compared to cows fed concentrate-based supplement (5+)
 - No difference between 2 vs. 3 days per week

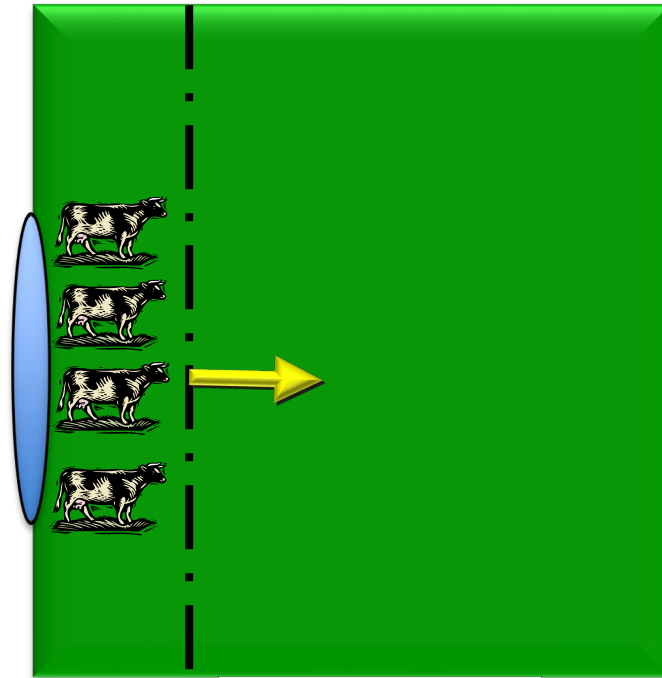
A Note on Stockpiling

- Stockpiling
 - A planned management technique allowing forage to accumulate for a time of later use
 - Common forage crop in TN: Tall fescue
 - Harvest in early fall, remove dry matter from field, fertilize, accumulate 8 to 10 weeks
 - Using improved grazing methods can help improve utilization of this standing forage

Strip-Grazing/Frontal Grazing



Strip-Grazing



Frontal Grazing

Strip-Grazing/Frontal Grazing

Pros

- Another form of rotational stocking
- Efficient use of forage
 - Animals graze area for a period of a few days before fence is moved forward
 - Especially good in stockpiled forage systems
 - Decreases animal selectivity in pastures

Cons

- Labor – medium to high
- Adaptability to large operations – need to be broken into manageable land units

DESIGNING YOUR GRAZING PLAN

Questions to Ask

- How much capital do you have available for investment?
- What are the feed requirements of your animals?
- Do you have shortage/abundance of forage from your pastures?
- What is the fencing condition?

Designing A Grazing Plan for Your Farm

Start
small/simple

“Do what you can, with what you have, where you are.” –Theodore Roosevelt

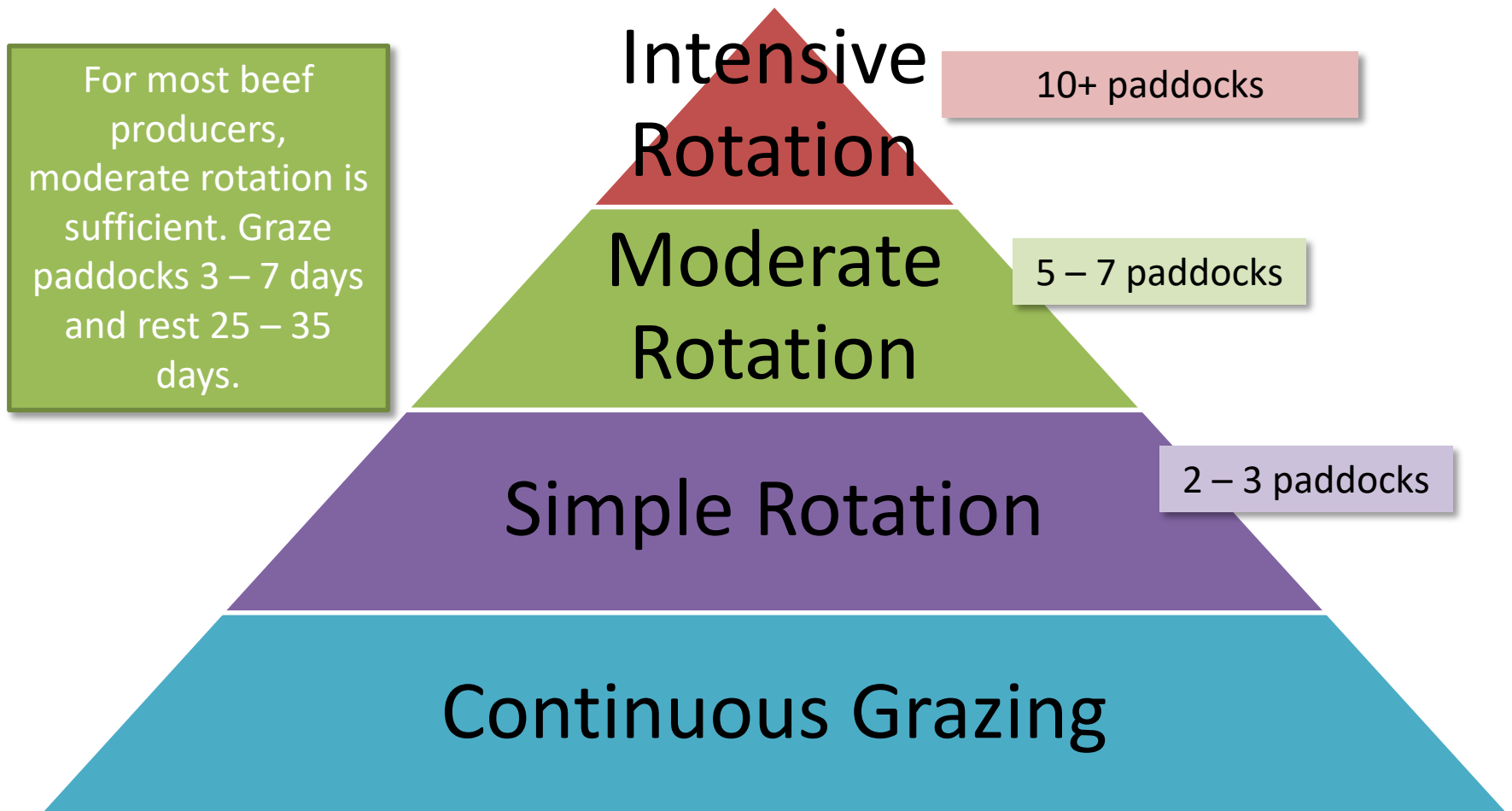
Be flexible

“Stay committed to your decisions, but stay flexible in your approach.” – Tony Robbins

You’ll get better
over time!

“Good judgement comes from experience, and a lot of that comes from bad judgement.” –Will Rogers

A Wide Range of Plans



Getting Started with Rotational Grazing

- Fencing – important for both plant and animal management
 - Good boundary fence + a way to subdivide
- Water
 - This is often the limiting factor in rotational grazing
 - Portable waterers, alleys/lanes, location/distance

Getting Started with Rotational Grazing (cont.)

- Paddock number, size, and shape
 - Optimal number depends on individual operator goals, environmental conditions, desired level of production, and type of forage
 - Size depends on total acreage, available forage, number of animals, production goals, and number of paddocks
 - Perennials: Less than 1 – 2 acres is not practical
 - Square paddocks are most economical and efficient; avoid long narrow or pie shapes if possible

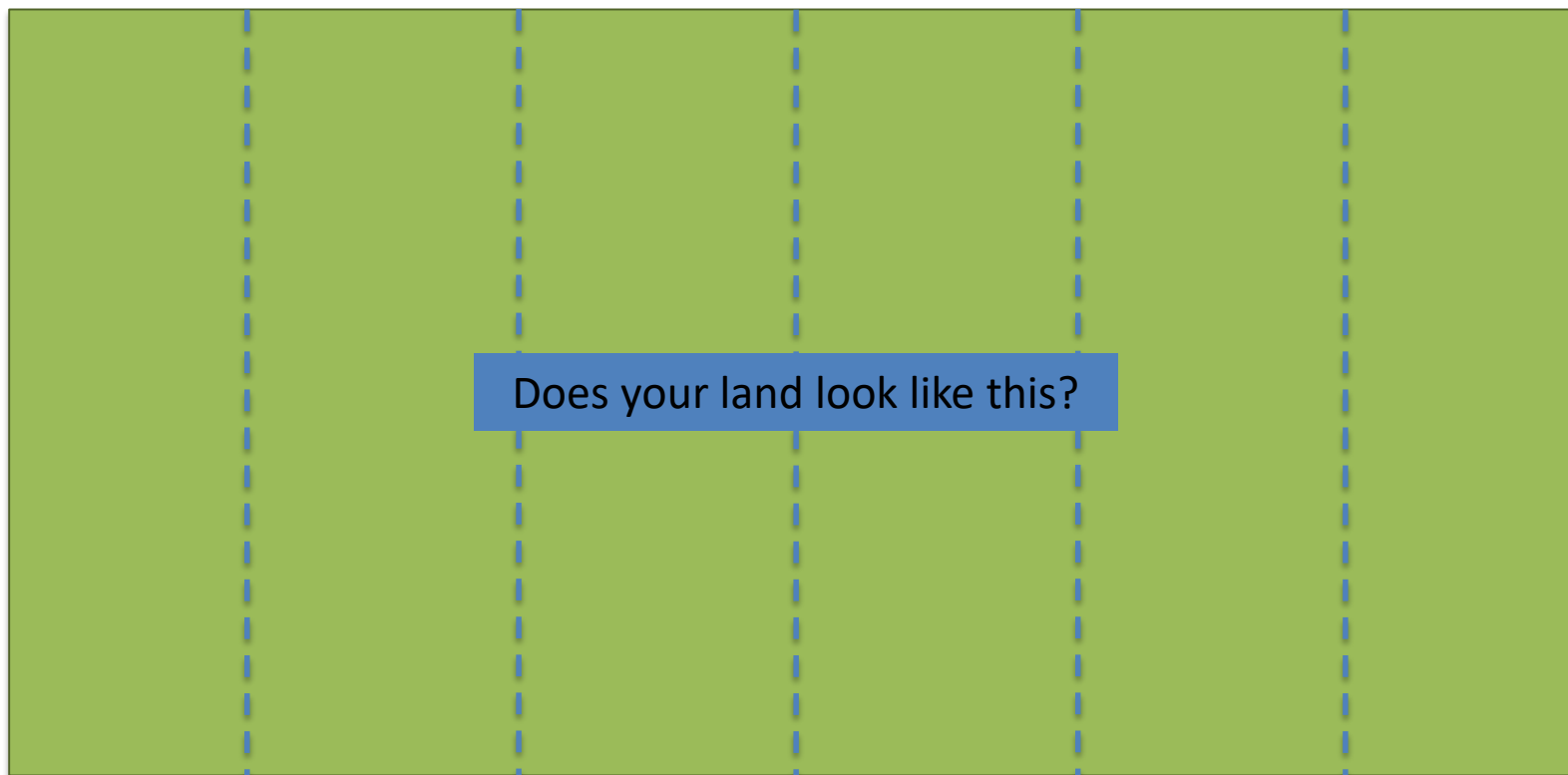
Tools of the Trade

- Assessment of resources
- Pasture map or general layout
 - Forage species
 - Soil fertility and organic matter
 - Topography, drainage, etc.
- Temporary electric fence equipment
- Grazing stick/pasture ruler
- Calculator, pen & paper, apps, etc.

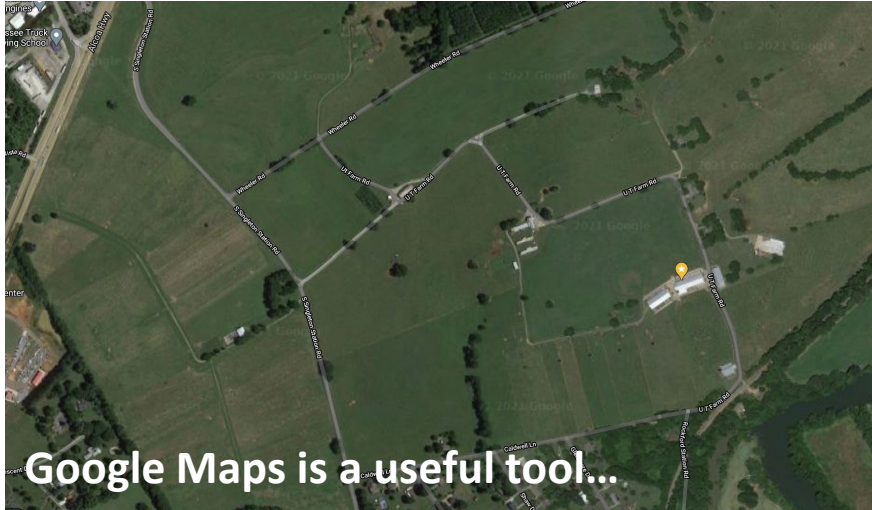
Assessment of Resources

Measurements to be taken	Decision to be made	Cost information
Land area	How much into pasture or other crops?	Renting vs. buying
Length and condition of existing fences	Type of fence to use	Fence and fencing supplies
Condition of existing watering system	Type of tanks and lines or ponds	Well, water line, and tank
Pasture composition, condition and productivity	Kind of pasture mix to use: cool and warm season grasses, legumes	Tillage, seed, and seeding. Herbicides and application
Soil characteristics	Kind of nutrients to use: fertilizer purchase, manure, compost	Fertilizer and application
Condition of existing machinery	What equipment is really needed? Till, no-till, animal impact	Repairs, new equipment, rental

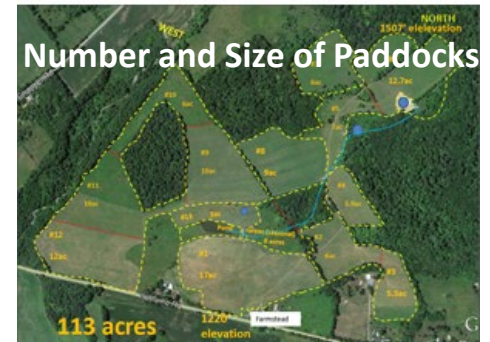
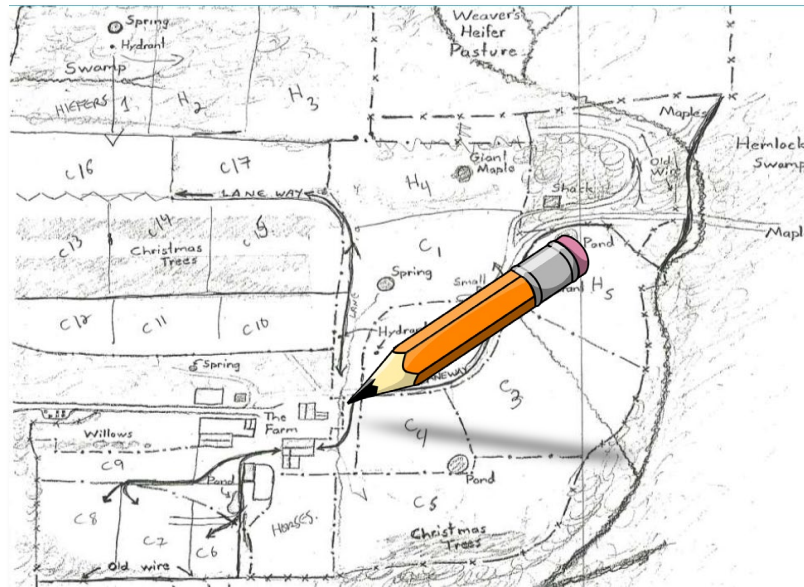
Pasture Map



Pasture Map



But it doesn't
have to be fancy!



Pasture Map

Figure 3. Example 80 acre farm.

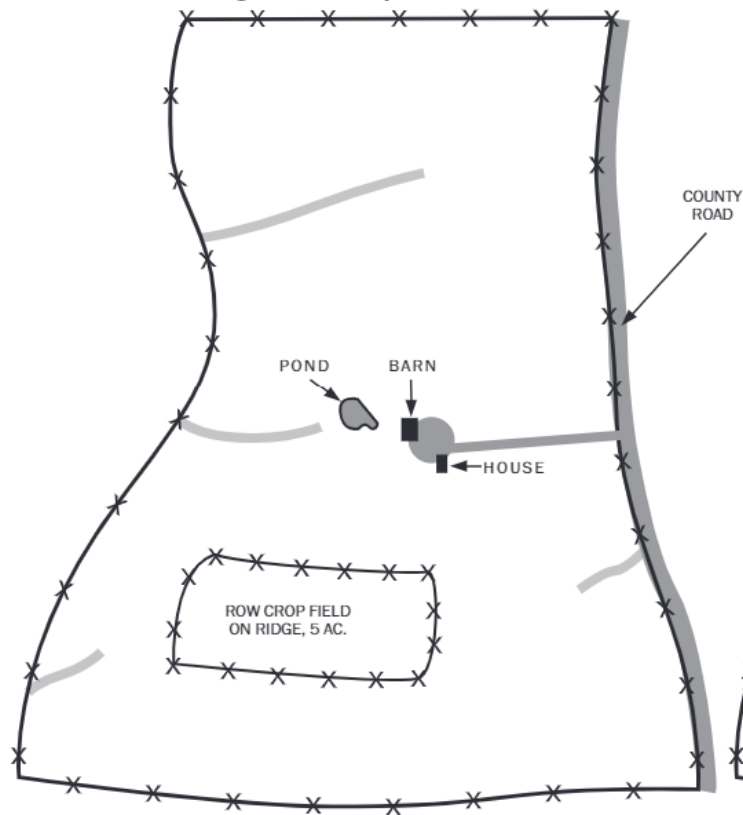
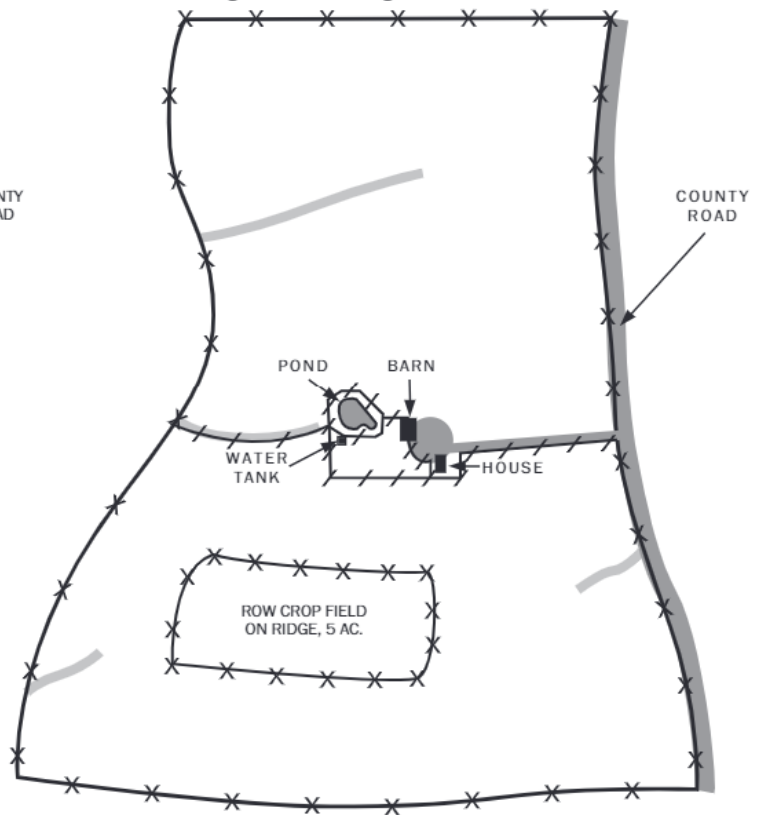


Figure 4. Adding a division fence



Source: Virginia Cooperative Extension – Planning Fencing Systems for Controlled Grazing

Pasture Map

Figure 5. Subdivision to four paddocks using permanent and temporary fence.

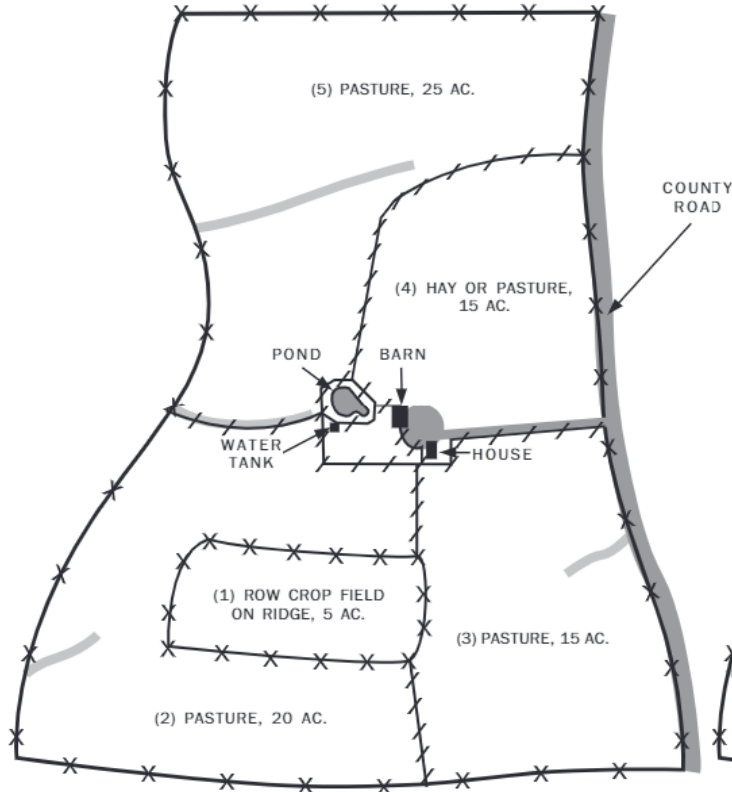
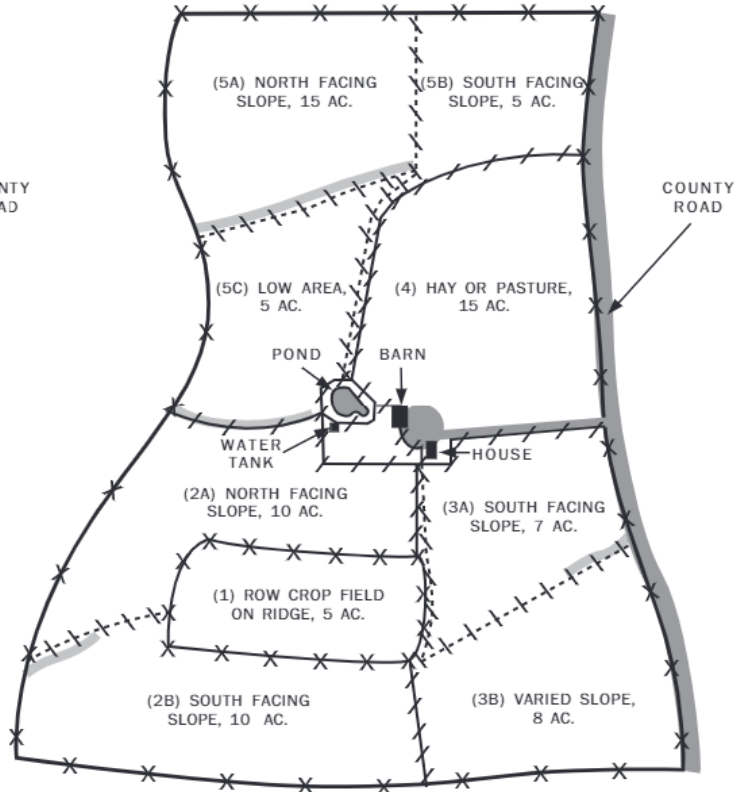


Figure 6. Subdivision to eight paddocks using portable fence.



Source: Virginia Cooperative Extension – Planning Fencing Systems for Controlled Grazing

Temporary Electric Fence

- There are many temporary fencing options
 - Poly wire, poly tape, single vs. multistrand, various step-in posts, chargers, reels, etc.
- **Train cattle to respect the wire!**



Monitoring the Grazing System

- Visual Forage Indicators
 - Pasture condition: vigor, health (poor to excellent)
 - Forage density: how thick is desirable vegetation
 - Color: degree of greenness
 - Pasture productivity: rate of regrowth
 - Uniformity of grazing

Monitoring the Grazing System

- Environmental Indicators
 - Erosion problems and soil characteristics
 - Trails or paths developing
 - Streambank erosion and cover
 - Plant diversity
 - Manure distribution
 - Earthworm populations
 - Wildlife presence or use

Monitoring Tools

- Soil testing
- Plant diversity (species composition)
- Pasture condition
 - Fair: Less than 75% ground cover or greater than 25% bare ground.
 - Good: 75 – 90% ground cover or 10-25% bare ground.
 - Excellent: At least 90% ground cover or less than 10% bare ground.
- Pasture productivity
 - Grazing stick, plate meter

When should I move to a new paddock?

- From *Southern Forages*, Ball et al. 2015
 - Look down – has it been grazed adequately?
 - Look ahead – Is the next paddock ready?
 - Look at animals – Appear hungry or in good condition?
 - Look behind – How fast is the paddock regrowing?
 - Look at the weather – Approaching rain or frost?
 - Look at the calendar – Is this forage in its active growth season?

Grazing Sticks

- Find a way to estimate forage mass/availability to help with stocking decisions
- Eventually you may get good enough to “eyeball it”

Yield estimate for fescue-clover mixtures

Pasture Canopy Height (in)	Dry Matter Yield (lb/ac)
2	700
4	1500
6	2000
8	2400



Photo: NDSU Extension

Grazing Calculations

How many paddocks do you need?

$$\frac{\text{Days of rest}}{\text{Days of grazing}} + 1$$

E.g. I want to graze a paddock for 4 days and let it rest for 28...

$$(28/4) + 1 = 8 \text{ paddocks}$$

Grazing Calculations

How many acres per paddock?

Avg Weight of Animals to be Grazed	×	Dry Matter Consumed (% of BW)	×	Number of Animals	×	Days on Paddock
<hr/>						
Dry Matter Available		×	% DM Utilized (Efficiency)			


E.g. I want to graze forty 600 lb steers consuming 3% of BW for 4 days. Twelve inches of growth, utilizing approximately 60%. In this stand, 1" = 225 lb/ac.

$$\frac{600 \times 0.03 \times 40 \times 4}{(12 \times 225) \times 0.60} = 1.8 \text{ acres}$$

Pasture Allocation

Pasture Allocation Worksheet				
Livestock Intake				
Livestock Class	Weight (lbs)	Stage of Production	Intake %	Intake (lbs DM/day)
Total Intake				
Forage Measurement				
Height (inch)	Residual (inch)	Forage Type/Thickness	Forage Per Inch (lbs DM/inch/A)	Available Forage (lbs DM/A)
Grazing Days Per Acre				
Available Forage	Total Intake	Grazing Days per Acre		
Allocation				
Acre (ft ²)	Width (ft)	Length (ft)	Grazing Days per Acre	Feet per Grazing Day
43560				
Grazing Period				
Grazing Period (days)	Feet per Grazing Day	Feet per Grazing Period		
Acres Needed for Rotation				
Rotation Length (Days)	Grazing Days per Acre	Acres Needed for Rotation		
Notes:				

Real. Life. Solutions.

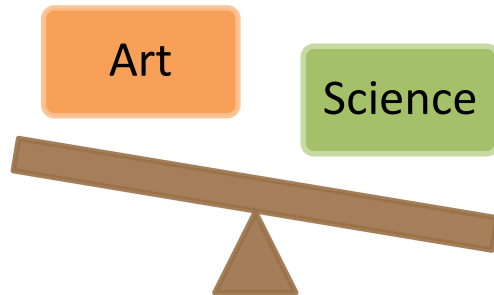


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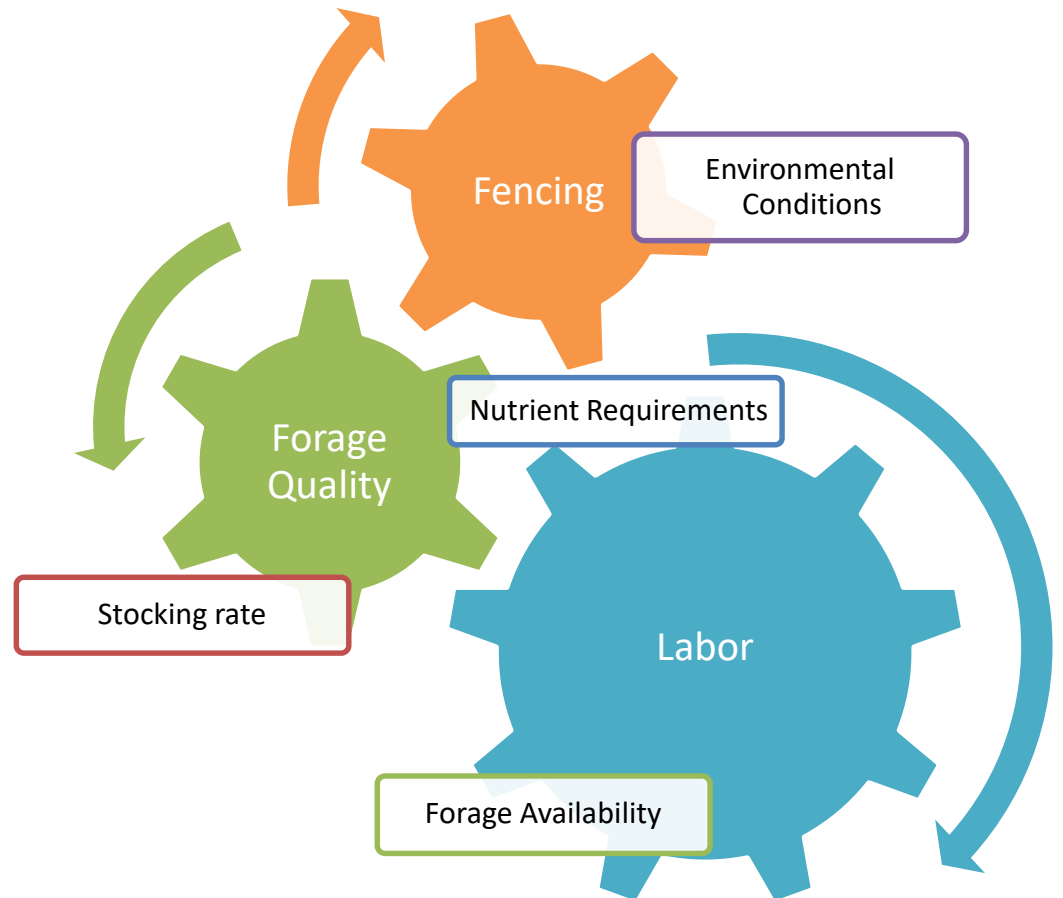
THE UNIVERSITY OF TENNESSEE

Putting it all into motion



Remember, start simple,
and just start and be
flexible.

Divide one pasture in
half, rotating as needed,
and build from there.



TAKE HOME MESSAGE

Key Points

- Use grazing methods to make efficient use of forage to meet livestock needs
- There has to be a balance between plants and animals
- Any amount of rotation will improve efficiency compared to continuous grazing
- Start simple and remain flexible

Questions?

Contact Information:

Katie Mason, PhD

865-974-8941

kmason21@utk.edu

