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Department of Natural Resources
Missouri Forage and Grasslands Council/Grazing Lands Conservation Initiative
Components of the Grazing System

- Landscape
- Forage
- Livestock
- Water
- Fence
Flexibility
The ability to adapt or modify, being responsive to changing conditions

Grazing management strategies must be flexible

Remember, we’re always shooting at a moving target!
Layout and Design Guidelines

- Keep livestock within 800 feet of water
Layout and Design Guidelines (cont.)

- Keep livestock within 800 feet of water
  - Improved grazing distribution
  - More uniform manure distribution
  - Increased water consumption
Figure 1. Impact of distance from water on temporal utilization rate in rectangular 10 acre paddocks.

R-square=.89
Manure Distribution

One paddock of 3–pasture rotation

- 10 - 20
- 20 - 30
- 30 - 40
- > 40

Piles per 500 ft²

One paddock of 24–pasture rotation

- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- > 70

Piles per 500 ft²
Layout and Design Guidelines (cont.)

- Keep livestock within 800 feet of water
- Make paddocks as near to square as possible
What is More Nearly Square?

Paddock “A” is more nearly square than Paddock “B”
Layout and Design Guidelines (cont.)

- Make paddocks as near to square as possible
  - Less fence required
Square Paddocks Require Less Fence

Each paddock is 10 acres!

- 2640 ft
- 3280 ft
- 3380 ft
Layout and Design Guidelines (cont.)

- Make paddocks as near to square as possible
  - Less fence required
  - Livestock are usually closer to water
Livestock will usually be closer to water in a square paddock

Three options for dividing a 40 acre pasture
Layout and Design Guidelines (cont.)

- Make paddocks as near to square as possible
  - Less fence required
  - Livestock are usually closer to water
  - More uniform grazing distribution
Figure 2. Impact of distance from water on temporal utilization rate in square and rectangular 10 acre paddocks.

R-square = 0.82
• Keep livestock within 800 feet of water
• Make paddocks as near to square as possible
• Follow landscape lines for paddock boundaries
Layout and Design Guidelines (cont.)

- Follow landscape lines for paddock boundaries
  - Soil type and drainage
  - Topography
  - Plant community
  - Plant growth rates
Grazing System Design

Make primary subdivisions along contour lines or major soil changes
Grazing System Design (cont.)

Make primary subdivisions along contour lines or major soil changes.
Layout and Design Guidelines

- Keep livestock within 800 feet of water
- Make paddocks as near to square as possible
- Follow landscape lines for paddock boundaries
- Make paddocks of similar grazing capacity
Layout and Design Guidelines (cont.)

- Make paddocks of similar grazing capacity
  - Keep diet(availability) more consistent
  - Ease of rotation management
  - Can maintain desired rest period regardless of order pastures are grazed
• Keep livestock within 800 feet of water
• Make paddocks as near to square as possible
• Follow landscape lines for paddock boundaries
• Make paddocks of similar grazing capacity
• Plan lanes for livestock movement only
Layout and Design Guidelines (cont.)

- Plan lanes for livestock movement only
  - Most erosion begins with vehicle traffic
  - 15 - 20% of manure deposited in lane
  - 15% higher water consumption if water available in paddock
  - Ease of livestock movement reduces stress on livestock and you
  - If it becomes too unhandy or hard to move livestock you quit or do what’s easy not necessarily graze what needs to be grazed next
Animal Movement

Goals

- Move livestock from any paddock to any other paddock without going through a third paddock
- Move animals from any paddock to working facilities without going through another paddock
Layout and Design Guidelines (cont.)

• Keep livestock within 800 feet of water
• Make paddocks as near to square as possible
• Follow landscape lines for paddock boundaries
• Make paddocks of similar grazing capacity
• Plan lanes for livestock movement only
• Provide secure training facilities
• Provide secure training facilities
  • When exposing new animals to electric fencing they must be trained to respect psychological barriers
    • Area must be a physical barrier
    • Crowd animals within physical barrier with electric fencing
    • Goal is to get as many animals educated (shocked) in as short of time as possible
  • Make 1st experience a memorable one
Layout and Design Guidelines (cont.)

- Keep livestock within 800 feet of water
- Make paddocks as near to square as possible
- Follow landscape lines for paddock boundaries
- Make paddocks of similar grazing capacity
- Plan lanes for livestock movement only
- Provide secure training facilities
- Plan for adverse weather conditions
Plan for adverse weather conditions

- Sacrifice paddock for extremely wet conditions and during drought
- Shelter from extreme cold/wet conditions
- Shade – during extreme heat
Do livestock need shade?

- It depends!
  - Are cattle grazing endophyte infected fescue?
  - Is the heat index over 100?
  - Have the cattle been selected for short hair coats and heat tolerance?
  - Is plenty of good quality water present?
  - What is the overall condition of the animals?
Shade – good and bad

- Cattle tend to congregate under shade even when they don’t need it
  - Time spent under shade reduces time spent grazing
  - Less grazing time results in less intake and reduced performance
  - Manure concentration vs. distribution

- Shade is probably needed to help reduce heat stress any time the heat index is 100 or above
  - Especially if livestock are grazing endophyte infected fescue
# Effects of endophyte and shade
## Cow/calf – MU Southwest Center 2000

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<th>E-S-</th>
<th>E-S+</th>
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<td>37.5</td>
<td>87.5</td>
<td>62.5</td>
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<tr>
<td><strong>Calves</strong></td>
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<td>1.70</td>
<td>1.87</td>
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Cows were bred AI/cleanup bull prior to study

Preg check at start of study confirmed 85-90% bred at the start of study

Evidently heat stress with no shade caused cows to slip calves

Studies elsewhere have shown heat stress with no shade reduced bull fertility/cow cycling.
## Effects of endophyte and shade Steers – MU Southwest Center 2001

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<thead>
<tr>
<th></th>
<th>E+S-</th>
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<th>E-S-</th>
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<td>1.46</td>
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<tr>
<td>ΔHS</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.1</td>
<td>-0.9</td>
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</table>
Providing Shade

- Shade can be portable, natural shade within the paddocks, or shaded areas to move livestock to.
  - Portable shade must be moved often to prevent nutrient displacement and maintain good ground cover
  - Some producers successfully graze shady paddocks during the day and move to paddocks with no shade at night
Providing Shade - portable
How many paddocks do I need?

• *It depends...*

- **length of grazing period desired**
  – producer goals, livestock performance
- **length of rest period needed**
  – based on plant needs, changes seasonally

-  
  - Paddock number = rest period needs
  - grazing period + 1
Grazing period Needs

- Plant based:
  - 2 - 5 days fast grow
  - 5 - 9 days moderate
  - 9 - 12 slow growth

- Animal performance:
  - .5 - 1 day dairy cows
  - 1 - 2 days growing/fattening
  - 2 - 4 days lactating beef cattle, sheep, goats, horses
  - 4 - 7 days dry animals
Matching forage and livestock resources

- Economic potential of grazing enterprises
  - Pasture-based dairy
  - Dairy replacements
  - Beef stockers
  - Sheep and goats, Cow-calf, Horses

Paddock #’s
Rest period needs

- Rest period needs:
  15 - 20 days during rapid growth
  20 - 30 days during moderate growth
  30 - 40 days during slow growth
  40 - 60 days very slow growth
How many paddocks do I need?

- Paddock Number = \( \frac{\text{rest period}}{\text{grazing period}} + 1 \)

- Ex:
  - 20 day rest period - spring
  - 3 day grazing period + 1 = 8
  
  - 40 day rest period - summer
  - 3 day grazing period + 1 = 14
How many paddocks do I need?

- Or:
  
  \[
  \frac{40 \text{ day rest period}}{5 \text{ day grazing period}} + 1 = 9
  \]

- You either have to have flexible paddock numbers or flexible grazing periods...they both can’t be static!
Fixed/Flexible System Design

- 9 paddock fixed system
- Flexible paddock numbers in hayfields and/or warm season grass
- Water available in every paddock
- Alleyway for ease of livestock movement
- Very flexible, workable system
Optimum Paddock #’s based on Livestock Type (Rule of Thumb for 15 – 45 days rest)

<table>
<thead>
<tr>
<th>Livestock type</th>
<th>Grazing Period (Days)</th>
<th>Paddock #</th>
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<tbody>
<tr>
<td>Dairy &amp; Beef finishing</td>
<td>0.5 – 1</td>
<td>20 - 90</td>
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<tr>
<td>Dairy Heifer &amp; Beef Stockers</td>
<td>1 - 2</td>
<td>15 - 45</td>
</tr>
<tr>
<td>Cow/calf, Sheep, Goats, Horses</td>
<td>2 - 5</td>
<td>8 - 16</td>
</tr>
</tbody>
</table>
Grazing System Design

- 2 types of systems
  - Fixed system
    - Uses permanent fence and watering points
  - Flexible system
    - Uses portable fence and water facilities in a framework of permanent fence
Grazing System Design

- 140 acre pasture
Grazing System Design (cont.)

- 140 acre pasture
- Intermittent streams
Grazing System Design (cont.)

- 140 acre pasture
- Intermittent streams
- One water source
Grazing System Design (cont.)

- 140 acre pasture
- Intermittent streams
- One water source
- Variable landscape
Grazing System Design (cont.)

- 140 acre pasture
- Intermittent streams
- One water source
- Variable landscape
- 2,000 ft maximum travel distance to water

2000 ft
Grazing System Design (cont.)

- Fixed system
  - Uses permanent fence and watering points
Guidelines for Grazing System Design

The starting point for planned grazing management

Can manage each field according to needs: fertility, plant species, growth/rest
Guidelines for Grazing System Design

The beginning of management-intensive grazing

Can you identify potential problems?
Fixed System Design

- 16 paddock system
Fixed System Design (cont.)

- 16 paddock system
- Water available in every paddock
Fixed System Design (cont.)

- 16 paddock system
- Water available in every paddock
- Alleyway for ease of livestock movement
Subdivision fencing:
18,744 feet  $3,650
= $26.07/acre
Fixed System Design (cont.)

Subdivision fencing:
18,744 feet  $3,650
= $26.07/acre

Water development:
Power  $700
Pump system  $1,200
Water lines & tanks  $4,150
TOTAL  $6,050
= $43.20/acre
Grazing System Design

- Fixed system
  - Uses permanent fence and watering points

Advantages:
- Relatively low cost on large installations
- Minimal daily labor
- Low maintenance
Larger grazing units have lower per acre costs for permanent fencing

* Based on single strand 12.5 gauge hi-tensile fence
Grazing System Design

- Fixed system
  - Uses permanent fence and watering points

**Advantages:**
- Relatively low cost on large installations
- Minimal daily labor
- Low maintenance

**Disadvantages:**
- Relatively high cost on small operations
- Limited management flexibility
Grazing System Design (cont.)

- Flexible system
  - Uses portable fence and water facilities in a framework of permanent fence
Flexible System Design

- Minimizes use of permanent fence
- Make corridors as near to parallel as feasible
- Keep fence spacing less than 660 feet
Flexible System Design (cont.)

Permanent fence
Flexible System Design (cont.)

Above ground water Line/quick connect couplings
Flexible System Design (cont.)

Can give daily allocations or can give a week's worth of grass if needed. Can cut part for hay without a lot of fences in the way. Gives maximum flexibility.
Grazing System Design

- Flexible system
  - Uses portable fence and water facilities in a framework of permanent fence

Advantages:

- Maximum management flexibility
- Lower initial capital cost
- Works well on rented land
Grazing System Design (cont.)

- Flexible system
  - Uses portable fence and water facilities in a framework of permanent fence

Advantages:
- Maximum management flexibility
- Lower initial capital cost
- Works well on rented land

Disadvantages:
- More daily labor required
- More maintenance
Summary

- There is no perfect system, only those that use good management principles to best fit available resources.
- The most flexible system will have some combination of permanent and portable fencing and water.