

2018 Georgia Grazing School:

Optimizing the size, number, and layout of your paddocks

Dr. Dennis Hancock
Prof. & Forage Ext. Specialist

Optimizing the size, number, and layout of your paddocks

Dr. Dennis Hancock,
Extension Forage Specialist
UGA – Dept. of Crop and Soil Sciences



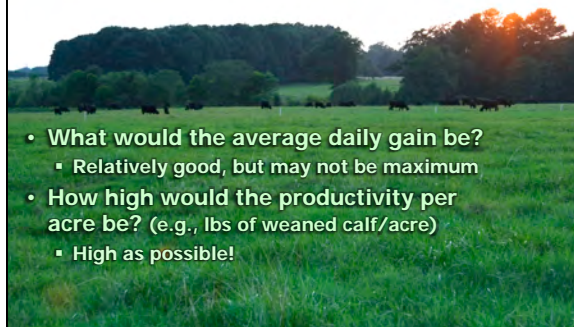
What is your production unit?



Do you seek to:

- A. Maximize profit per cow
- B. Maximize profit per acre

Ideally Stocked



- What would the average daily gain be?
 - Relatively good, but may not be maximum
- How high would the productivity per acre be? (e.g., lbs of weaned calf/acre)
 - High as possible!

Lightly Stocked



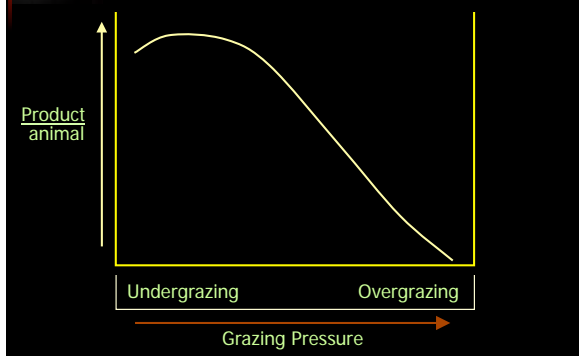
- What would the average daily gain be?
 - Maximum ADG, getting the “goodie”
- How high would the productivity per acre be? (e.g., lbs of weaned calf/acre)
 - Relatively low

Overgrazed Pasture



- What would the average daily gain be?
 - Relatively low
- How high would the productivity per acre be? (e.g., lbs of weaned calf/acre)
 - Relatively low

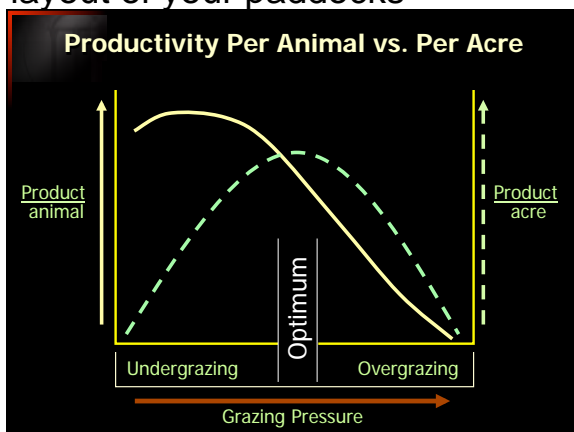
Productivity Per Animal vs. Per Acre



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Basic Grazing Numbers

Forage Need

- Animal Data
 - Animal Weight (lbs)
 - Rate of Dry Matter Intake (DMI, %)
 - Head

Logistics

- Grazing Data
 - Rest Period (d)
 - Days in a Given Paddock (d)
 - Number of Paddocks
 - Grazing Efficiency (%)
 - Paddock Size (acres)

Available Forage

- Production Data
 - Acres Available (acres)
 - Available Forage_{before} (lbs/acre)
 - Available Forage_{after}
 - Available Forage_{diff}
 - Stocking Rate
 - Stocking Density

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Estimating Forage Need

By % of body weight (Table Data):

| Animal Class | Forage Intake Range (DM as a % of b.w.) |
|--------------------------------|--|
| Dairy cow | 2.0 - 4.0 |
| Dairy heifer | 2.2 - 2.8 |
| Bull | 1.5 - 1.9 |
| Beef, cow (dry) | 1.7 - 2.0 |
| Beef, cow (late gest.) | 1.8 - 2.1 |
| Beef, cow (early lact.) | 1.9 - 2.4 |
| Beef, stocker (steer) | 2.4 - 3.2 |
| Beef, stocker (heifer) | 2.2 - 2.6 |
| Beef, finishing | 2.3 - 2.5 |
| Beef, replacement heifers | 2.0 - 2.4 |
| Sheep, ewes (dry) | 1.5 - 2.0 |
| Sheep, ewes (late gest.) | 2.2 - 3.2 |
| Sheep, ewes (early lact.) | 3.0 - 4.8 |
| Horse, Mature (maint.) | 1.0 - 2.0 |
| Horse, Mature (late gest.) | 1.0 - 2.0 |
| Horse, Mature (early lact.) | 1.3 - 2.6 |
| Horse, Weanling (< 600 lbs) | 2.3 - 2.8 |
| Horse, Yearling (600-1000 lbs) | 2.0 - 2.3 |
| Goat, nanny (dry) | 1.5 - 2.0 |
| Goat, nanny (late gest.) | 2.2 - 3.2 |
| Goat, nanny (early lact.) | 2.8 - 4.8 |

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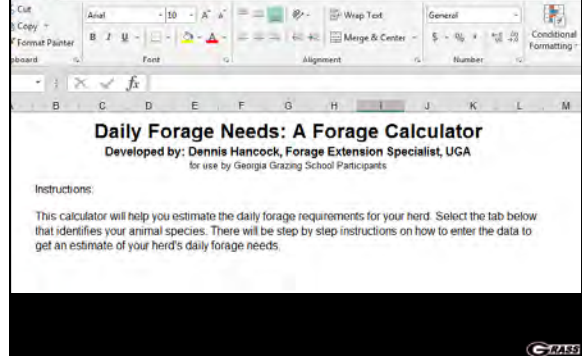
→ Beef, cow (dry)

1.7 - 2.0

$$2400 \text{ lbs/d} = 1200 \text{ lb cow} \times 2.0\%/\text{hd/d} \times 100 \text{ hd}$$

Daily Forage Need - Calculator

Daily Forage Need Calculator



| Species | Animal Class | Animal Numbers (head) | Average Body Weight (lb/head) | Recommended Range of Daily Intake Rates (% of b.w.) | Selected Rate of Daily Forage Intake (% of b.w.) | Estimated Intake Needed Daily (lb/day) | Grazing Efficiency (%) | Availability Requirement |
|---------|------------------|-----------------------|-------------------------------|---|--|--|------------------------|--------------------------|
| Beef | Beef, Cow/Heifer | 100 | 1200 | 17-20 | 2 | 2,400 | 75 | |
| | None Selected | | | | | - | | |
| | None Selected | | | | | - | | |
| | None Selected | | | | | - | | |
| | None Selected | | | | | - | | |
| | None Selected | | | | | - | | |
| | None Selected | | | | | - | | |
| | None Selected | | | | | - | | |
| | Total: | | | | | 2,400 | | |

Important: Make changes only in colored boxes.

Step 1: Select up to three animal classes from the pick lists.

Step 2: List the number of animals.

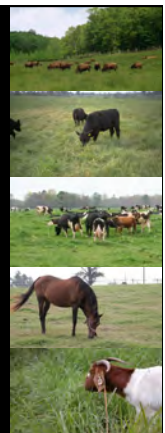
Step 3: Enter the average body weight of the animals in that class.

Step 4: Select a daily forage intake rate from the pick list that falls within the recommended range.

Step 5: Enter a grazing efficiency factor. Move your cursor over the column heading for a guide.

Basic Grazing Numbers

- | | |
|------------------|--|
| Forage Need | <ul style="list-style-type: none"> • Animal Data <ul style="list-style-type: none"> ▪ Animal Weight (lbs) ▪ Rate of Dry Matter Intake (DMI) ▪ Head |
| Logistics | <ul style="list-style-type: none"> • Grazing Data <ul style="list-style-type: none"> ▪ Rest Period (d) ▪ Days in a Given Paddock (d) ▪ Number of Paddocks ▪ Grazing Efficiency (%) ▪ Paddock Size (acres) |
| Available Forage | <ul style="list-style-type: none"> • Production Data <ul style="list-style-type: none"> ▪ Acres Available (acres) ▪ Available Forage_{before} (lbs/acre) ▪ Available Forage_{after} ▪ Available Forage_{diff} ▪ Stocking Rate ▪ Stocking Density |



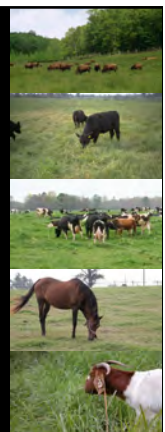
Grazing Rules of Thumb

| Crop | Target Height (inches) | | Recommended Rest Period (days) |
|-------------------------|------------------------|--------------|--------------------------------|
| | Begin Grazing | End Grazing* | |
| Alfalfa (grazing types) | 10-16 | 2-4 | 15-30 |
| Annual Ryegrass | 6-12 | 3-4 | 7-25 |
| Bahiagrass | 6-10 | 1-2 | 10-20 |
| Bermudagrass | 6-12 | 2-6 | 10-20 |
| Clover, White | 6-8 | 1-3 | 7-15 |
| Clovers, Other | 8-10 | 3-5 | 10-20 |
| Orchardgrass | 8-12 | 3-6 | 15-30 |
| Pearl millet | 20-24 | 8-12 | 10-20 |
| Small grains | 8-12 | 4 | 7-30 |
| Sorghum/sudan | 20-24 | 8-12 | 10-20 |
| Switchgrass | 18-22 | 8-12 | 30-45 |
| Tall Fescue | 4-8 | 2-3 | 15-30 |

* Height at end of grazing may need to be higher to optimize intake of quality forage or vigorous re-growth.

Basic Grazing Numbers

- | | |
|---------------------|--|
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| Logistics | |
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Paddock Number

How many paddocks should I use?

- Ideally, one should first consider the needs of the grass.
 - How much rest period is needed?
 - How long should I keep them in a paddock?
 - i.e., how many days between rotations?

$$\text{Number of Paddocks} = \frac{\text{Days of Rest}}{\text{Days of Grazing}} + 1$$

$$9 \text{ Paddocks} = \frac{24 \text{ days of rest}}{3 \text{ days of grazing}} + 1$$

Bermudagrass 24 days rest 3 days grazing

Paddock Size

How big should my paddocks be?

- This is where it all comes together...
 - In the meantime, let's refresh our memory on grazing efficiency.

$$\text{Paddock Size} = \frac{\text{Animal Weight} \times \% \text{DMI} \times \text{Head} \times \text{Days in Paddock}}{\text{Available Forage}_{\text{diff}} \times \text{Grazing Efficiency \%}}$$

Efficiencies of Grazing and Mechanized Harvest

| Method | Efficiency |
|----------------------------------|------------|
| Grazing | |
| Continuous Stocking | 30-40% |
| Slow Rotation (3-4 paddocks) | 50-60% |
| Moderate Rotation (6-8 paddocks) | 60-70% |
| Strip Grazing, Daily Rotation | 70-80% |
| Mechanical | |
| Hay | 30-70% |
| Silage | 60-85% |
| Green Chop | 70-95% |

Paddock Size

How big should my paddocks be?

- This is where it all comes together...

$$\text{Paddock Size} = \frac{\text{Animal Weight} \times \% \text{DMI} \times \text{Head} \times \text{Days in Paddock}}{\text{Available Forage}_{\text{diff}} \times \text{Grazing Efficiency \%}}$$

- 100 head herd
- 500 lb heifers with 3% daily forage intake
- 4 day grazing in paddock
- 2000 lb available forage per acre
- Grazing efficiency of 60%

Paddock Size

$$\text{Paddock Size} = \frac{500 \text{ lb} \times 3 \% \text{ DMI} \times 100 \text{ Head} \times 4 \text{ Days in Paddock}}{2000 \text{ lb per acre} \times 60\%}$$

$$\text{Paddock Size} = 5 \text{ acres}$$

- 100 head herd
- 500 lb heifers with 3% daily forage intake
- 4 day grazing in paddock
- 2000 lb available forage per acre
- Grazing efficiency of 60%

The Primary Calculations

$$\text{Available Acres} = \frac{\text{Paddock Size}}{\text{Number of Paddocks}}$$

$$\text{Paddock Size} = \frac{\text{Animal Weight} \times \% \text{DMI} \times \text{Head} \times \text{Days in Paddock}}{\text{Available Forage}_{\text{diff}} \times \text{Grazing Efficiency \%}}$$

$$\text{Number of Paddocks} = \frac{\text{Days of Rest}}{\text{Days in Paddock}} + 1$$

Grazier's Arithmetic: A Grazing Calculator

GALES



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Grazing Calculator

Grazier's Arithmetic: A Grazing Calculator (ver. 1.0)
Developed by: Dennis Hancock, Forage Extension Specialist, UGA

Instructions:
Have a question about grazing arithmetic? Select a question and click on the link to the right to calculate the answer. Once on the calculation page, enter or alter the numbers that are blue in the "To answer this, you need to know" section.

Questions:

- How many head can I carry? [Click Here](#)
- How many acres do I need for the number of animals that I have? [Click Here](#)
- What should the rest period be? [Click Here](#)
- How many days should I leave the animals in the paddock before I rotate them? [Click Here](#)
- What should I use as a target level for the residual forage (in dry lbs/acre)? [Click Here](#)

How many head can I carry?

To answer this, you need to know:

| Animal Data | |
|-------------------------------------|------|
| Animal Weight | 1200 |
| Rate of Dry Matter Intake (DMI, %) | 2.0% |
| Grazing Data | |
| Rest Period | 24 |
| Days in a Given Paddock | 2 |
| Grazing Efficiency | 70% |
| Number of Paddocks | 10 |
| Production Data | |
| Acres Available | 200 |
| Available Forage _{pasture} | 3000 |
| Available Forage _{year} | 1500 |
| Available Forage _{year} | 1500 |

Answer

| | |
|--------------------|----------|
| Head | 356.5385 |
| Ideal Paddock Size | 15.38462 |
| Stocking Rate | 1.682692 |
| Stocking Density | 21.875 |

[Return to Question Page](#)

COWBOY MATH

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ga/technical/landuse/pasture/>

Where to start?

- Do a pasture inventory.
 - Acres, water, soil fertility...
- Identify cost-assistance opport
- Sketch out the "ideal."
- Develop a phase-in plan.
- Use training wheels.
 - Temporary: Learning/Laborious
 - Permanent: Convenient/Fixed
- Build in flexibility.

Rules of Thumb:

- A 2-4 day rotation works best for most beef operations.
 - For bermuda based pastures, 8-10 paddocks is best.
 - Allows 20-26 day rest period.
- Place water within 400-600 ft of all parts of paddock.
- Isolate shade, mineral feeder, and water from one another.
 - Place shade away from paddock entrance.

Resources

THE UNIVERSITY OF GEORGIA
COLLEGE OF AGRICULTURAL & ENVIRONMENTAL SCIENCES

ABOUT CAES DEPARTMENTS ACADEMICS EXTENSION RESEARCH PUBLICATIONS TOPICS A-Z CALENDAR NEWS

CAES Home
Commodities
Sustainable Ag
Management-Intensive Grazing

- Forage Allocation
- Management of Forage Supply
- Grazing System Design
- Economics
- Considerations
- Farmer Case Studies
- News & Events
- FAQs
- Links
- Contact

MANAGEMENT-INTENSIVE GRAZING

Commodities: Sustainable Agriculture

What is Management-Intensive Grazing?

Management-intensive Grazing (MIG) refers to several grazing systems wherein animals are allowed to graze only a small portion of the pasture (an individual paddock) while other paddocks are rested and allowed to recover. By rationing the pasture in a MIG system, Georgia farmers can make more efficient use of their land than if they continually keep animals in one large pasture (i.e., continuous stocking). Management-intensive Grazing systems, of which there are many variations, can increase the yield of animal products per acre and, in most cases, net profit per farm.

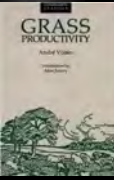
Quick Links

- Georgia Forage
- New Zealand Grazing
- Chow - Kentucky
- Forage

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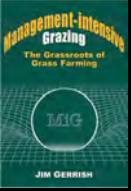
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Resources

Grass Productivity – Andre Voisin, 1959.
On Google Books or available for purchase



Resources

Management-intensive Grazing– Gerrish 2008.
On Google Books and Amazon

Resources



<http://www.nrcs.usda.gov/wps/portal/nrcs/main/ga/technical/landuse/pasture/>



Rotational Grazing



Using a Grazing Stick for Pasture Management

