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## USDA Natural Resources Conservation Service Science and Technology



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### 2015 Webinars



#### Conservation of Natural Resources Webinars

Date	Title
07/08/2015	Forage Management for Livestock Production
07/21/2015	Overview of Tillage Implements for use in RUSLE2 Calculations: Focus on New Implements and Manure and Pesticide Incorporation
07/28/2015	Silviculture for Non-foresters: Managing a Forest for Multiple Objectives
07/29/2015	Technologies for Addressing Phosphorus Associated with Livestock Operations
08/04/2015	Opportunities for Conservation in Organic Livestock Systems
08/11/2015	Using the National Air Quality Site Assessment Tool for Air Quality Conservation Planning at Dairies
08/12/2015	Using the National Air Quality Site Assessment Tool for Air Quality Conservation Planning at Swine Operations
08/12/2015	Wisconsin Edge-of-Field Monitoring Experience: Perspectives and Lessons Learned
08/13/2015	Using the National Air Quality Site Assessment Tool for Air Quality Conservation Planning at Poultry Operations
08/26/2015	OSHA Requirements, Agency Policy, and General Safety Guidelines for Field Office Activities
08/27/2015	Environmental Benefits of Organic Agriculture: Soil
09/23/2015	Environmental Benefits of Organic Agriculture: Water Quality

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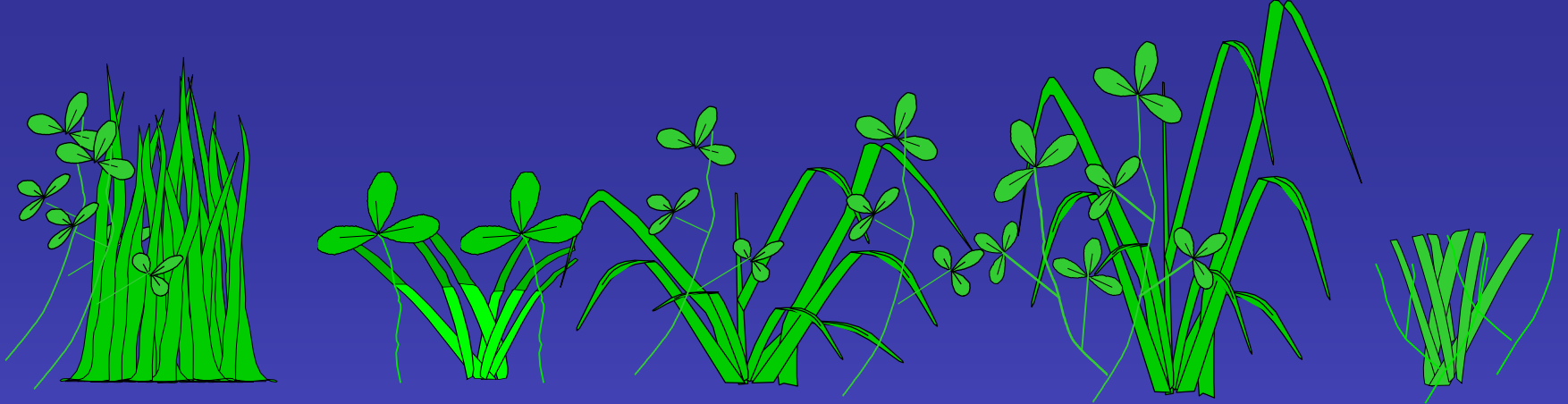
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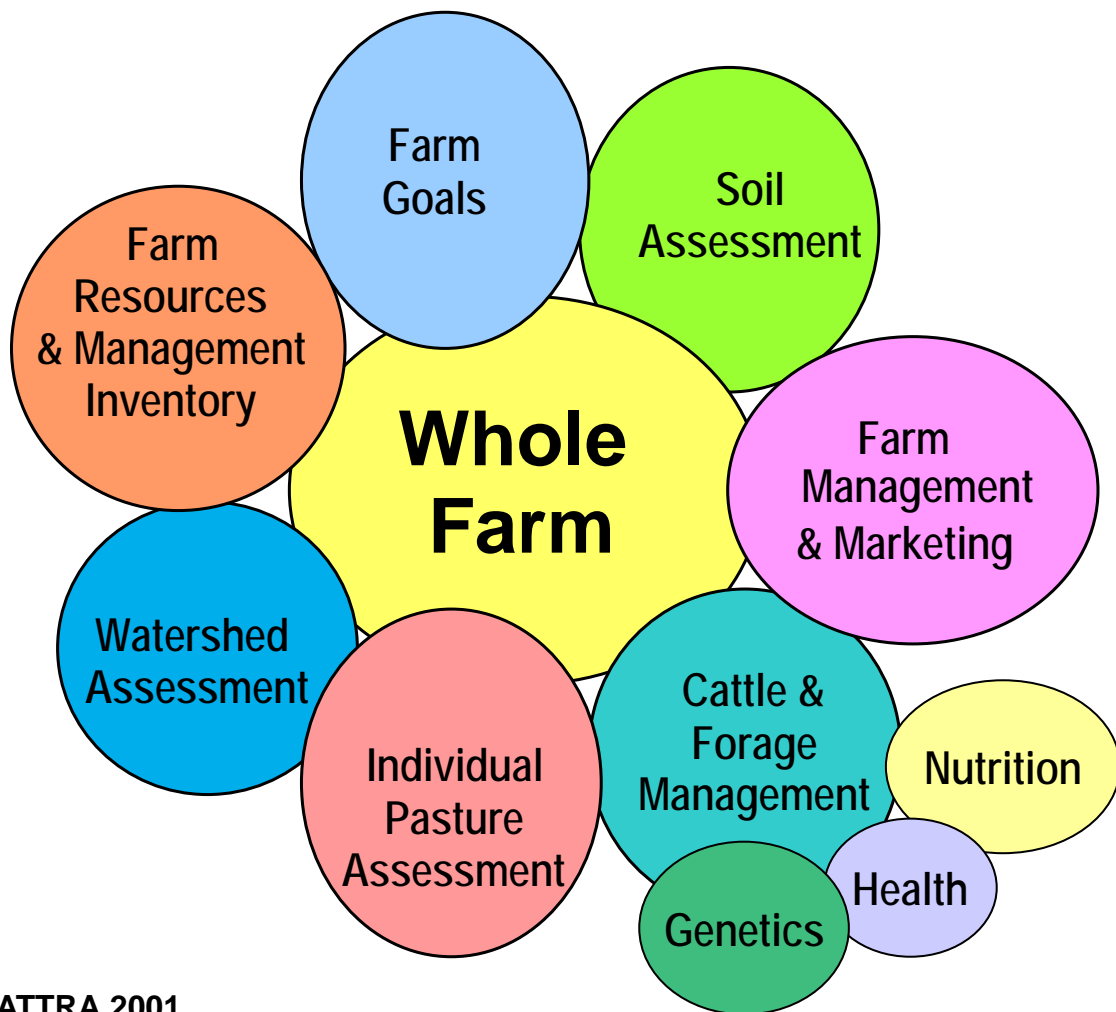
# Forage Management for Livestock Production

Johanna Pate

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Specialist

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Each operation has a unique combination of human, physical, and natural resources based assets, attributes, problems, and concerns.

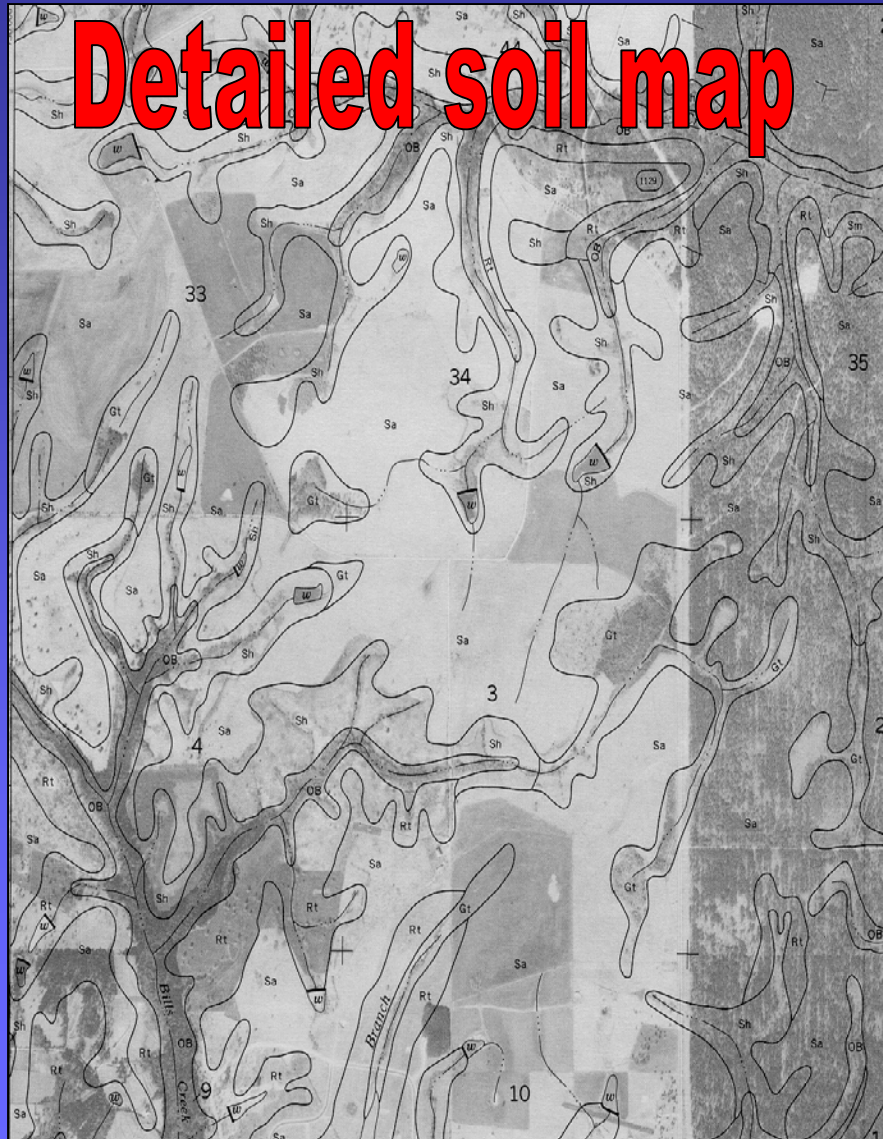


A one size fits all approach to resource management does not work!

# Information Needs

- Soil
- Pasture and forages
- Livestock
- Water
- Fences
- Facilities
- Equipment
- Shade
- Environmentally sensitive areas
- Labor and management
- Capital

# Inventory Resource Base – Soil



- Do you have a soils map of your farm?
- Do you have a current soil test for each pasture?
- Are current soil fertility practices based on soil test results?

# Inventory Resource Base – Soil



- **Are there any physical problems?**

- Poor drainage
- Compaction
- Erosion



- **How much slope exists in each pasture?**

- Will it restrict livestock use

# Inventory Resource Base – Pastures and Forages

- What are the forage species present?
- Is pasture uniformly grazed?
- How severely grazed is the pasture?
- What percent ground cover exists?



# Inventory Resource Base – Pastures and Forages

- Are weeds present? If so, how severe and what type?
- How many pastures currently exist?
- Do you stockpile or bale your excess forage?
- How many days per year do you feed hay?



# **Inventory Resource Base – Pastures and Forages**

- Does considerable variation of forage production exist within each pasture?**
- How long does it take your pasture to exhibit drought stress?**

# Inventory Resource Base – Pastures and Forages

- **Has pasture condition decreased?**
  - Increased erosion
  - Decrease in desirable species
  - Larger proportion of concentration areas



# Inventory Resource Base – Livestock

- How many cows do you have and on how many acres?
- What is the overall condition and average weight of the cows in your herd?
- Do you spring calve, fall calve, or calve year round?



# Inventory Resource Base – Livestock

- Are your cows above average, average, or below average in milking ability?
- Do you have inefficient cows and, if so, how many?
- If you are a cow-calf producer, do you also retain ownership and background your calves?

# Inventory Resource Base – Water

- Does your present water supply provide sufficient quantity and quality of water?
- Are there potential water quality problems



# Inventory Resource Base – Water

- If cross-fencing is utilized in the future to create more pastures, can present water supplies be easily modified to provide water to new pastures?
- Is a limited access point used for watering from a pond or stream?



5/9/2000

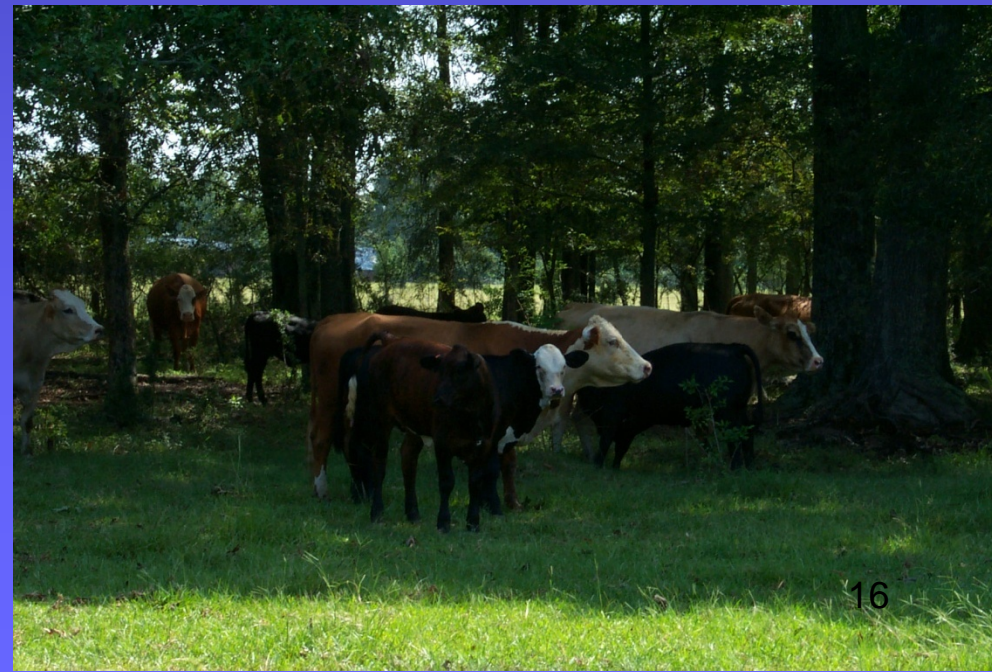
# Inventory Resource Base – Fences

- Are outer perimeter fences well-constructed?
- Do natural contours exist that would lend themselves to crossfencing to provide additional pastures or lanes if needed in the future?
- Are cross fences traditional wire or electric?
- What is the condition of the cross fences?



# Inventory Resource Base

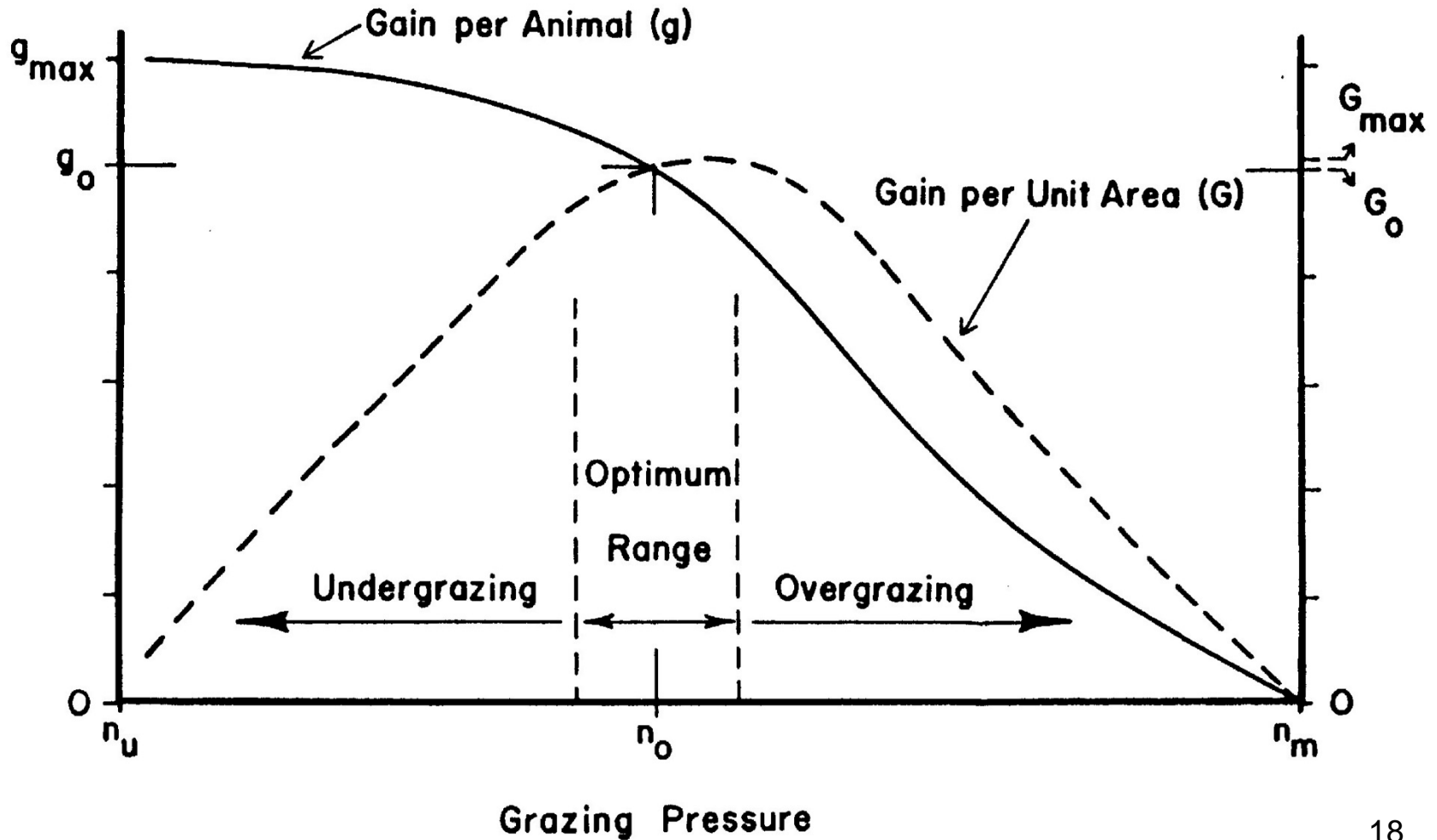
- Shade/shelter
- Environmentally sensitive areas
- Physical facilities
- Capital, labor, & management



# Balancing Forage and Livestock Production

Matching Animals, Management,  
and Forages

# Gain/animal vs Gain/acre



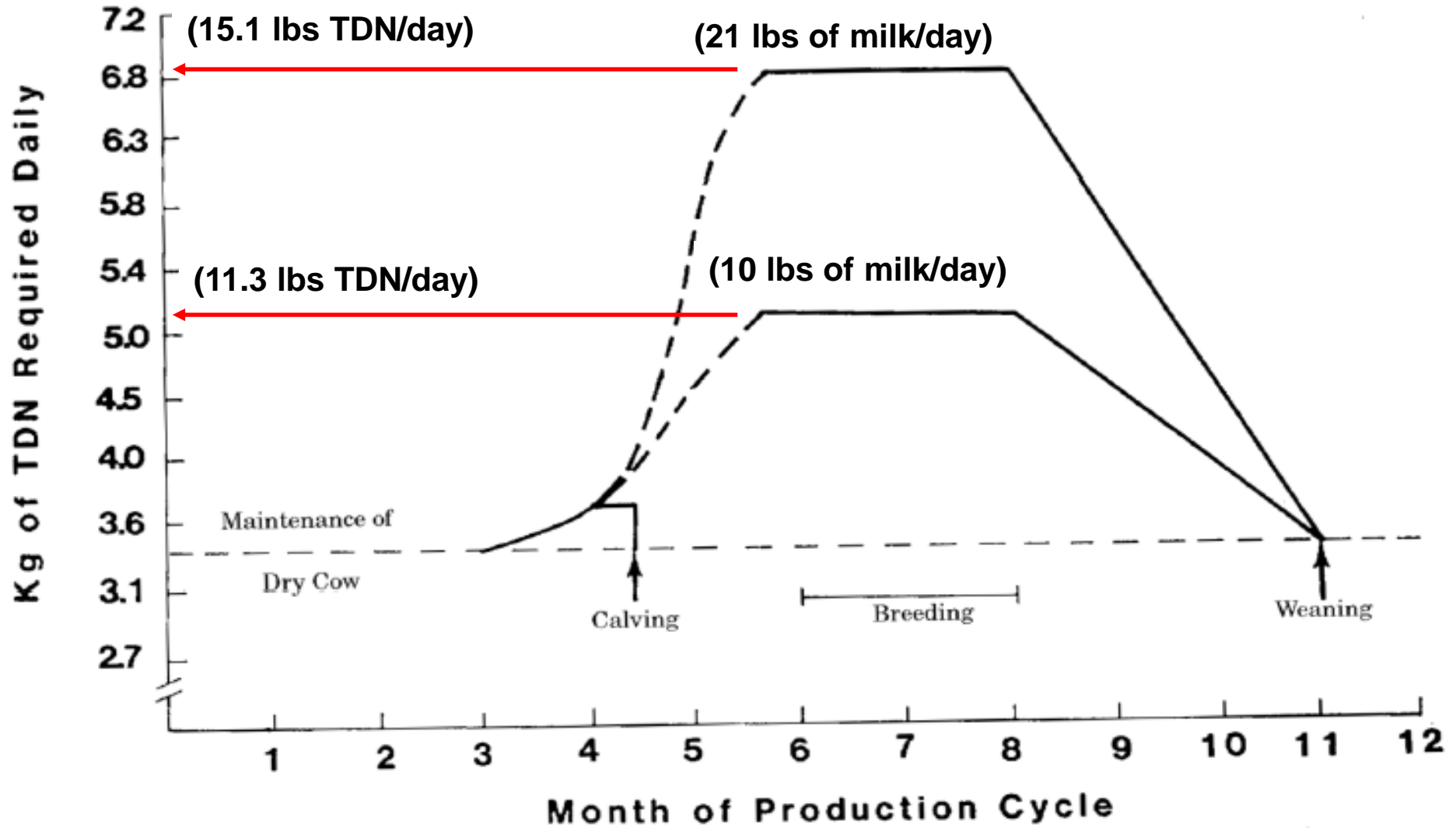
# Grazing System Objectives

## Animal considerations

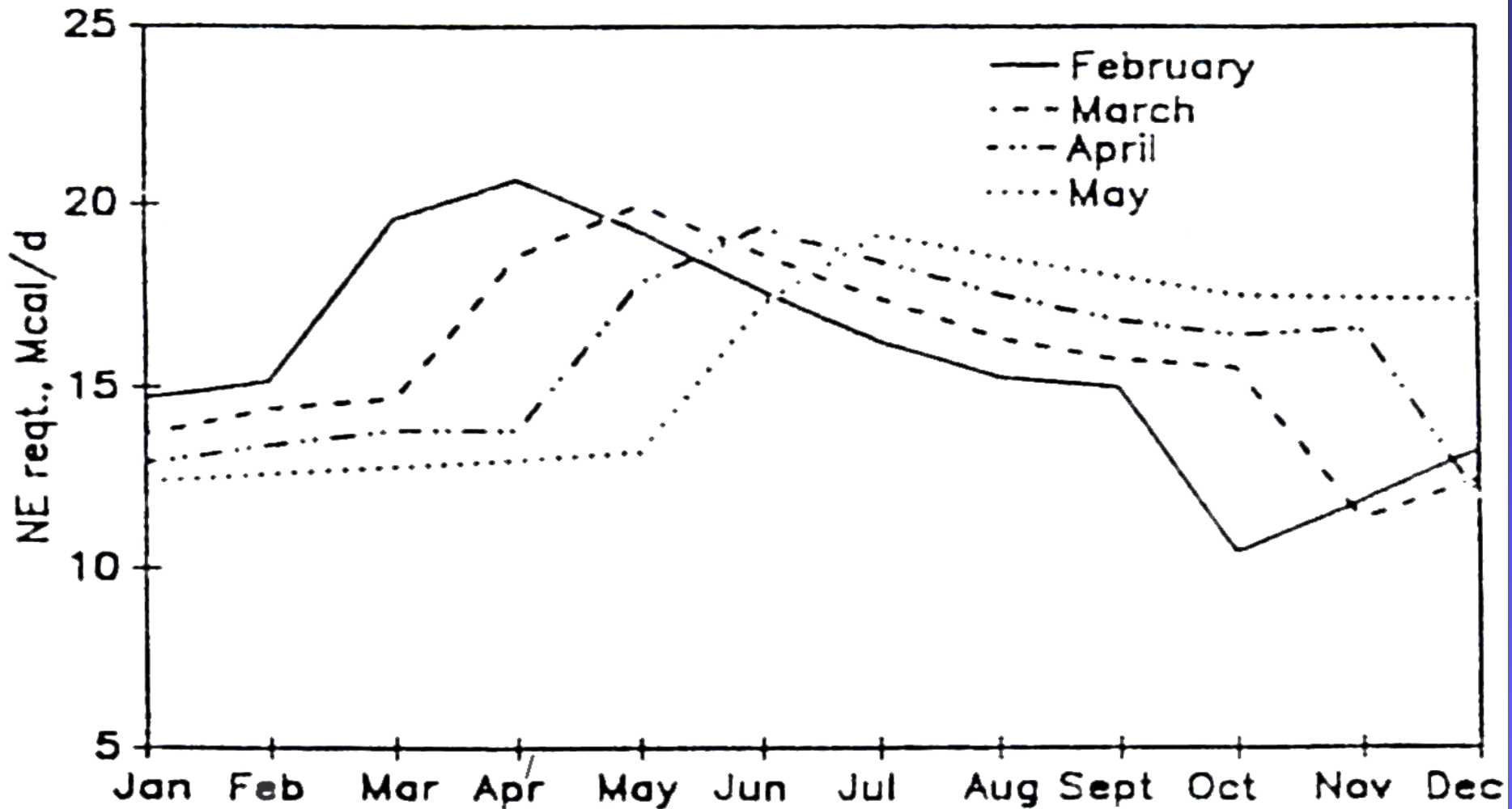
- Provide acceptable if not maximum animal gains
- Meet animal nutrition needs during critical periods
  - Growing animals
  - Lactating animals
- Provide adequate forage quantity and quality
- Fit into the total grazing management plan
- Adjust grazing management to accommodate calving periods



- **What are the goals of your breeding program?**
  - **Are there breeds that would better fit your**
    - **environment**
    - **forage or management program?**
    - **marketing program?**
  - **Do your animals match your resources?**



# DIFFERENT CALVING DATES FOR SIMMENTAL COWS



Net energy requirements in mega-calories/day

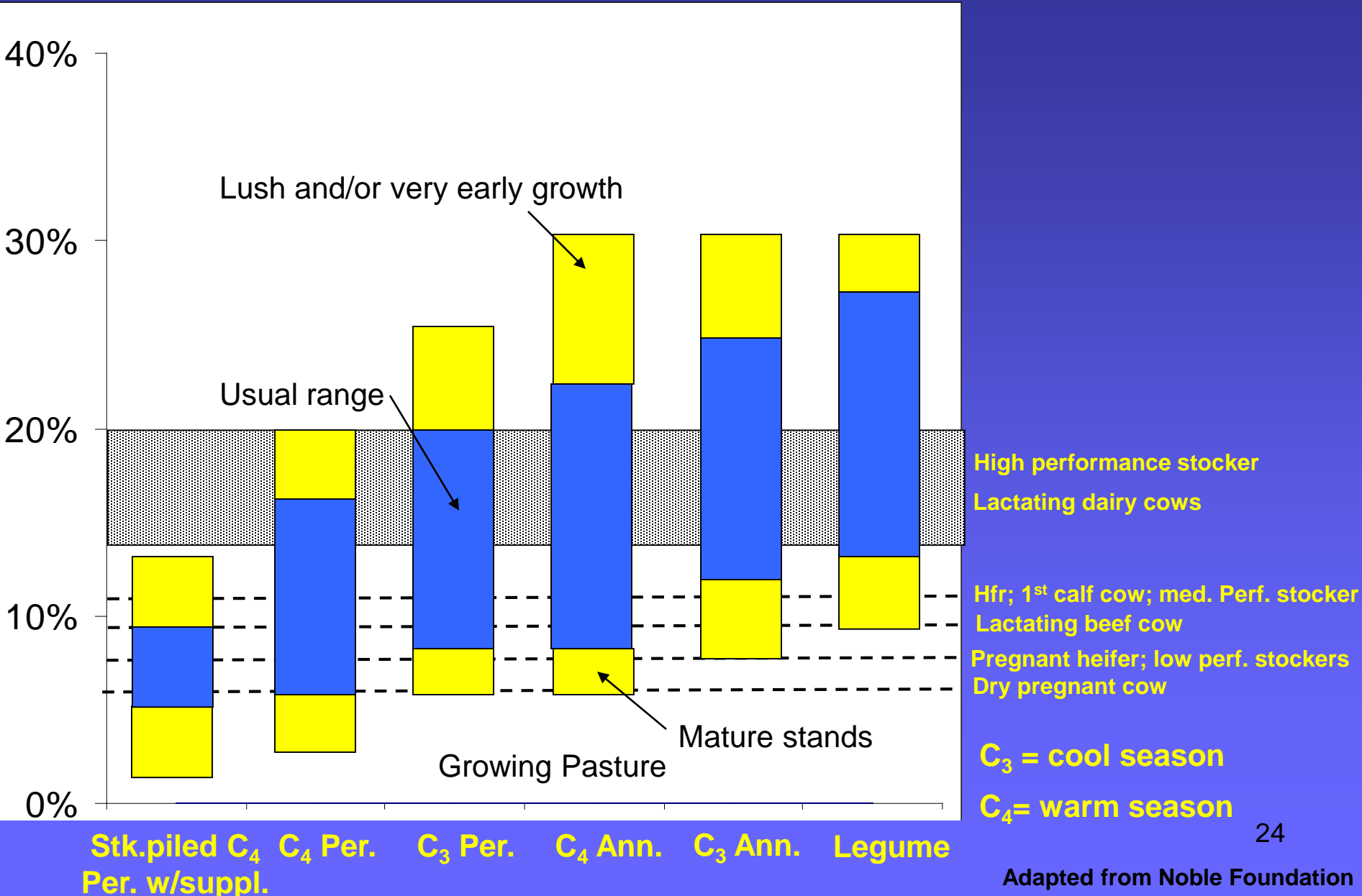
# Grazing System Objectives

## Forage considerations

- Adaptability of forages to climate and soils
- Matching forages to livestock needs
- Maximizing the length of the grazing season
- Grazing or harvesting method



# Summary of Livestock % Crude Protein Requirements and Pasture Quality by Forage Group





**>20% CP; 70-80% digestibility**



**10-17% CP; 61-70% digestibility**



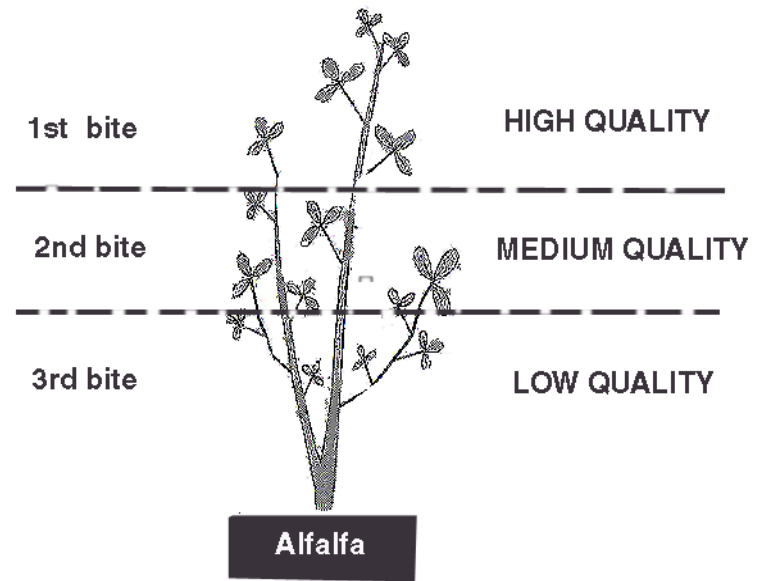
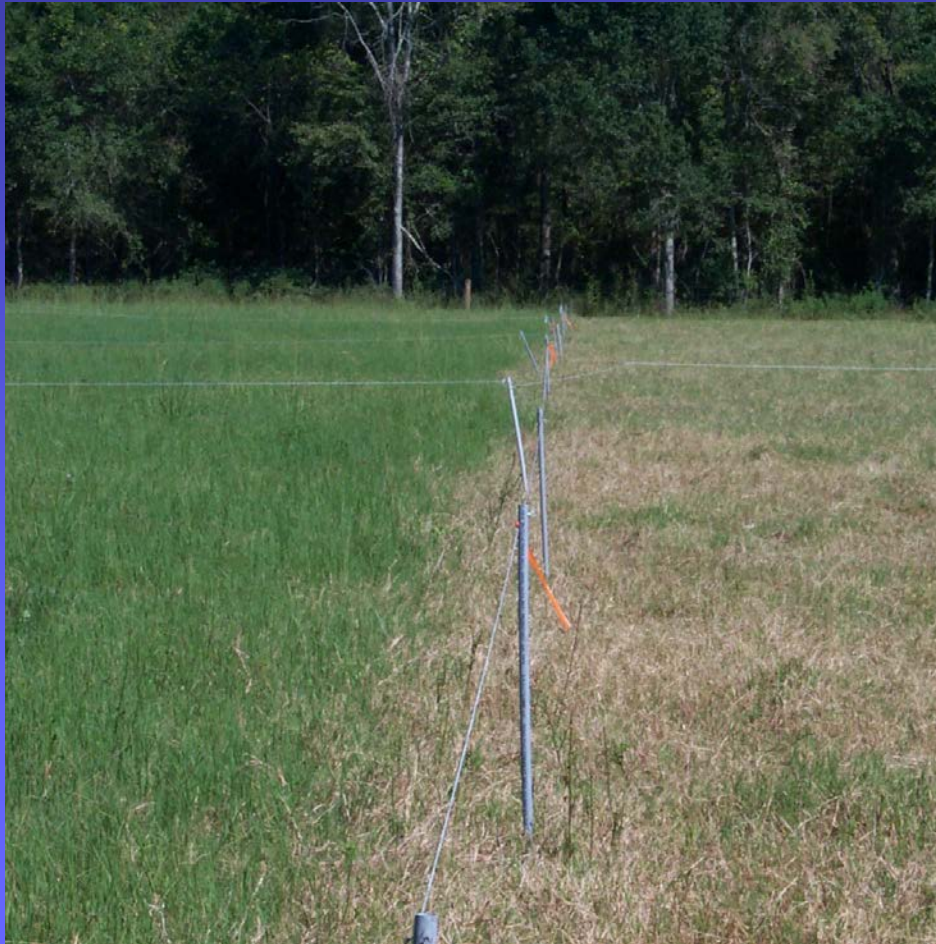
**6-9% CP; 58-63% digestibility**



**$\leq 5\%$  CP;  $\leq 56\%$  digestibility**

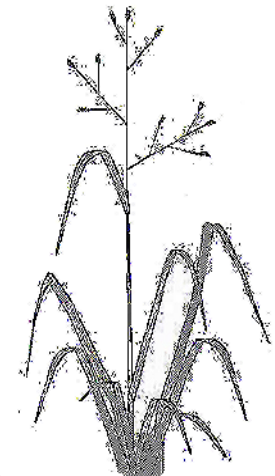
**Quality of feed going into an animal 24-72 hours ago**

# We can impact quality of “feed” going into an animal by how we graze



HIGH QUALITY

LOW QUALITY



Vegetative Stage

Reproductive Stage

# Determining Stocking Rates

Balancing Forage Supply with  
Animal Demand

# Definitions

## Animal Unit

- the amount of air-dry forage a 1,000 lb cow will eat in a day (approximately 26 lbs). May be expressed as an animal unit day, animal unit month, or animal unit year

## Stocking rate

- The number of animals grazing an area of land (usually the farm or ranch) for a specific period of time (usually a season or year). Expressed as: animal units/unit area

## Stock density

- The number of animal units or live weight present within a pasture or paddock of known area for a specified time (usually a day)

# Definitions

Grazing period - the time that a group of animals occupy a pasture or paddock



# Definitions

## Grazing cycle

- The time required to make one complete cycle of the paddocks in a grazing unit

## Rest period

- The amount of time between the end of one grazing period and the start of the next one on the same paddock

# Stocking Rates

- Answers the questions
  - How much will the animal consume
  - How much forage is available to consume
- Enables us to develop
  - Annual forage budgets (long-term)
  - Estimates of forage on hand to support management decisions (short-term)



# Determining Overall Stocking Rate for the Farm or Ranch (long-term)

- Acres of land
- Forage production
- Utilization percent or amount of residual to leave
- Daily forage intake
- Length of grazing period



# Step 1

## How much forage is being produced?

- **Sources of information**
  - University research information on forage variety trials
  - Hay production records
  - NRCS Forage Suitability Groups or Ecological Site Descriptions
  - Vendor information
- **Three methods for determining production estimates**
  - Measured – clip and weigh method
  - Calculated – acre-inch method
  - Observed – experience

# Step 2

## How much forage is available for grazing?

- Total forage production does not equal available forage for consumption
- Two methods to determine forage availability
  - Utilization percentage (how much to take)
    - Different grazing methods will have different utilization rates
    - As grazing intensity increases utilization rate increases
  - Residual forage (how much to leave)
    - Leave a specified stubble height remaining in a pasture after grazing period or season

Species	Minimum heights prior to grazing (inches)	Minimum residual grazing heights (inches)		Average recovery period (days)
		Continuous grazing	Rotational grazing	
<b>Grasses</b>				
Annual ryegrass	8	4	3	14-21
Bahiagrass	4	3	2	20-26
Bermudagrass, common	4	3	2	18-24
Bermudagrass, hybrid	6	4	3	18-24
Carpetgrass	4	3	2	18-24
Dallisgrass	5	4	3	18-24
Eastern gamagrass	15	10	8	24-38
Johnsongrass	20	8	6	21-30
Oats	8	4	3	14-21
Rye	8	4	3	14-21
Sudangrass	20	8	6	21-30
Switchgrass	12	8	6	24-38
<b>Legumes</b>				
Annual lespedeza	4	3	2	18-24
Crimson clover	8	4	3	16-24
Subterranean clover	4	3	2	14-21
White clover	4	3	2	14-21

## Step 3:

# How much will an animal eat each day?

On average throughout an entire year a cow will consume 2.6% of its body weight every day

Animal	Daily intake
Dry/pregnant cows	1.5 – 2.5
Lactating cows	2.5 – 3.5
Stockers/heifers	2.5 – 3.5
Bulls	2.5 – 3
Horses	2 – 3.5
Sheep/goats	3.5 – 4

# Measuring Forage Consumption

- Consumption is based on the amount of air-dry forage a 1,000 lb cow will eat in a day and is termed an Animal Unit
  - Animal Unit Day (AUD) = 26 pounds
  - Animal Unit Month (AUM) = 791 pounds
  - Animal Unit Year (AUY) = 9,492 pounds
- The consumption of all other animal classes is based on these figures

# Putting It All Together

**Stocking rate =**

$$\frac{\text{Forage Production/Acre/Year} \times \text{Utilization Rate} \times \text{Acres of Land}}{(\text{Average Daily Intake} \times \text{Animal Weight}) \times \text{Length of Grazing Period}}$$

**Year-long stocking rate with no off farm hay or forage brought in:**

$$\frac{8,000 \text{ lbs of forage produced} \times 0.5 \text{ utilization rate} \times 120 \text{ acres}}{(0.026 \text{ lbs of forage/lbs of liveweight} \times 1,000 \text{ lbs}) \times 365 \text{ days}}$$

**= 50 animals on 120 acres or 2.4 acres/animal**

# Putting It All Together

**Season-long stocking rate based on production of summer pasture:**

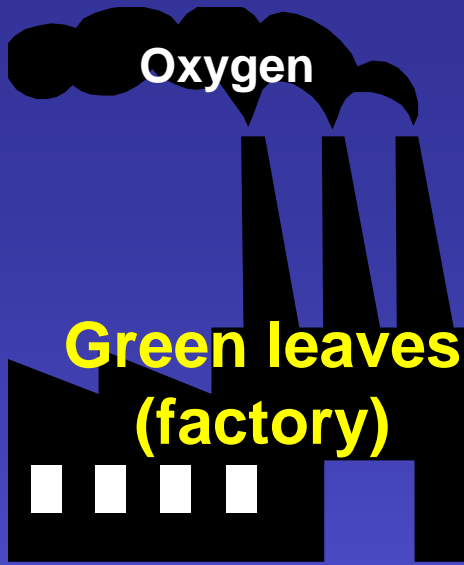
$$\frac{6,900 \text{ lbs of forage produced} \times 0.5 \text{ utilization rate} \times 120 \text{ acres}}{(0.03 \text{ lbs of forage/lbs of liveweight} \times 1,000 \text{ lbs}) \times 210 \text{ days}}$$

**= 66 animals on 120 acres or 1.8 acres/animal**

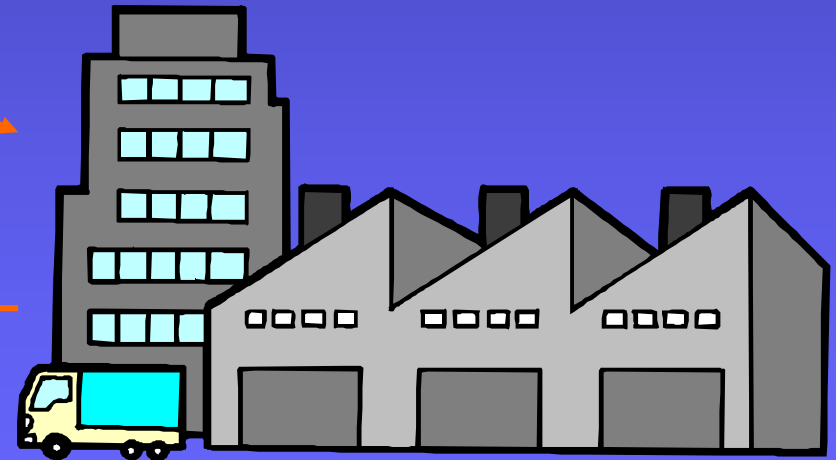
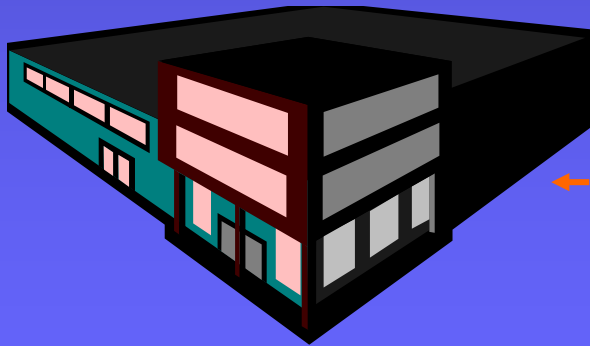
# Managing the Grazing System

Forage Growth and  
Response to Grazing

# Energy (carbohydrates) manufacture, storage, and use



## Raw production materials

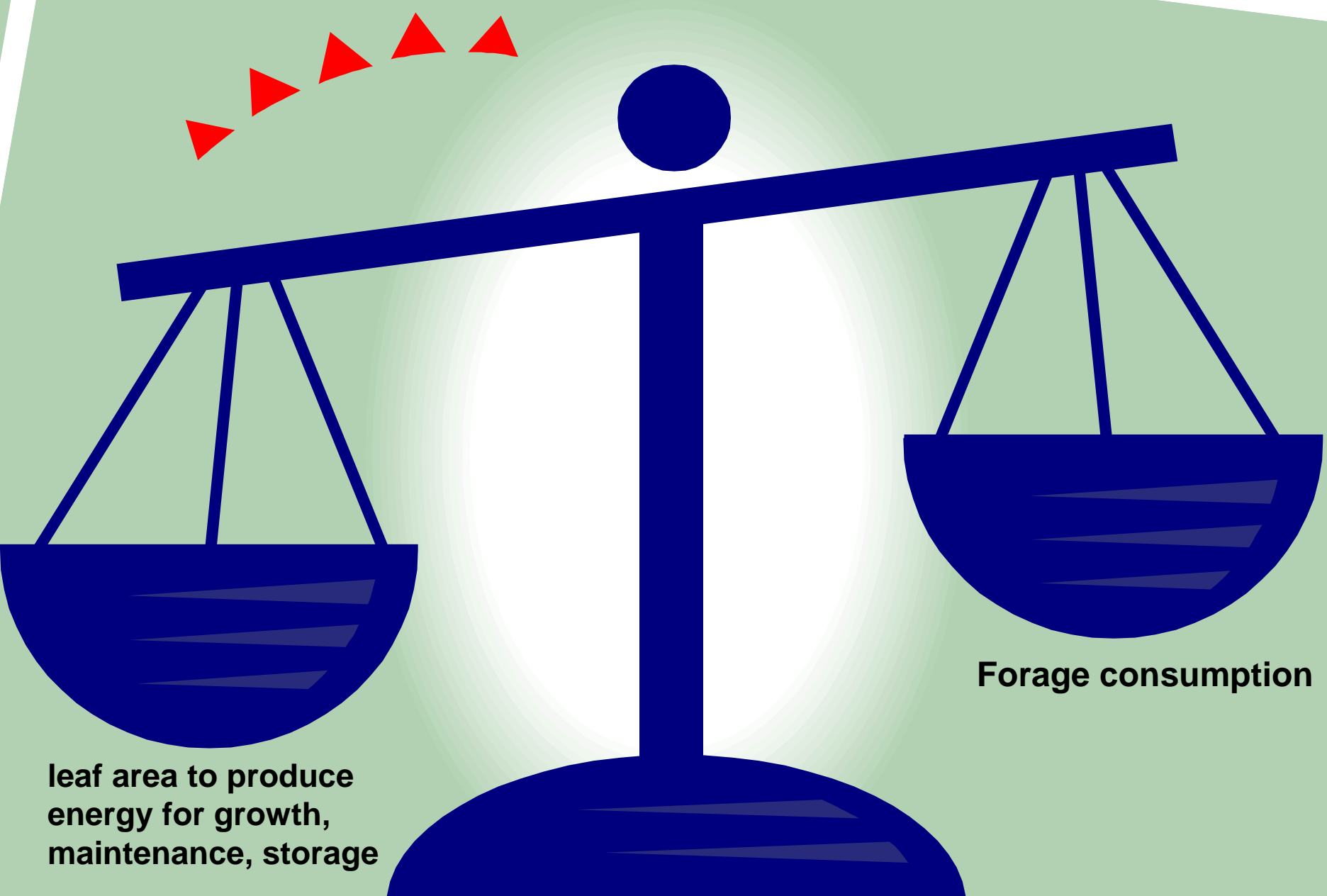


Energy Use  
(consumer demand)

Energy storage

# Things to Remember About Energy Production and Use

- Energy production only occurs during daylight hours; energy use occurs 24/7
- Growth has priority over storage
- Energy storage increases when growth rate slows and leaf area is large
- Energy storage decreases when leaf area is small and growth rate is fast

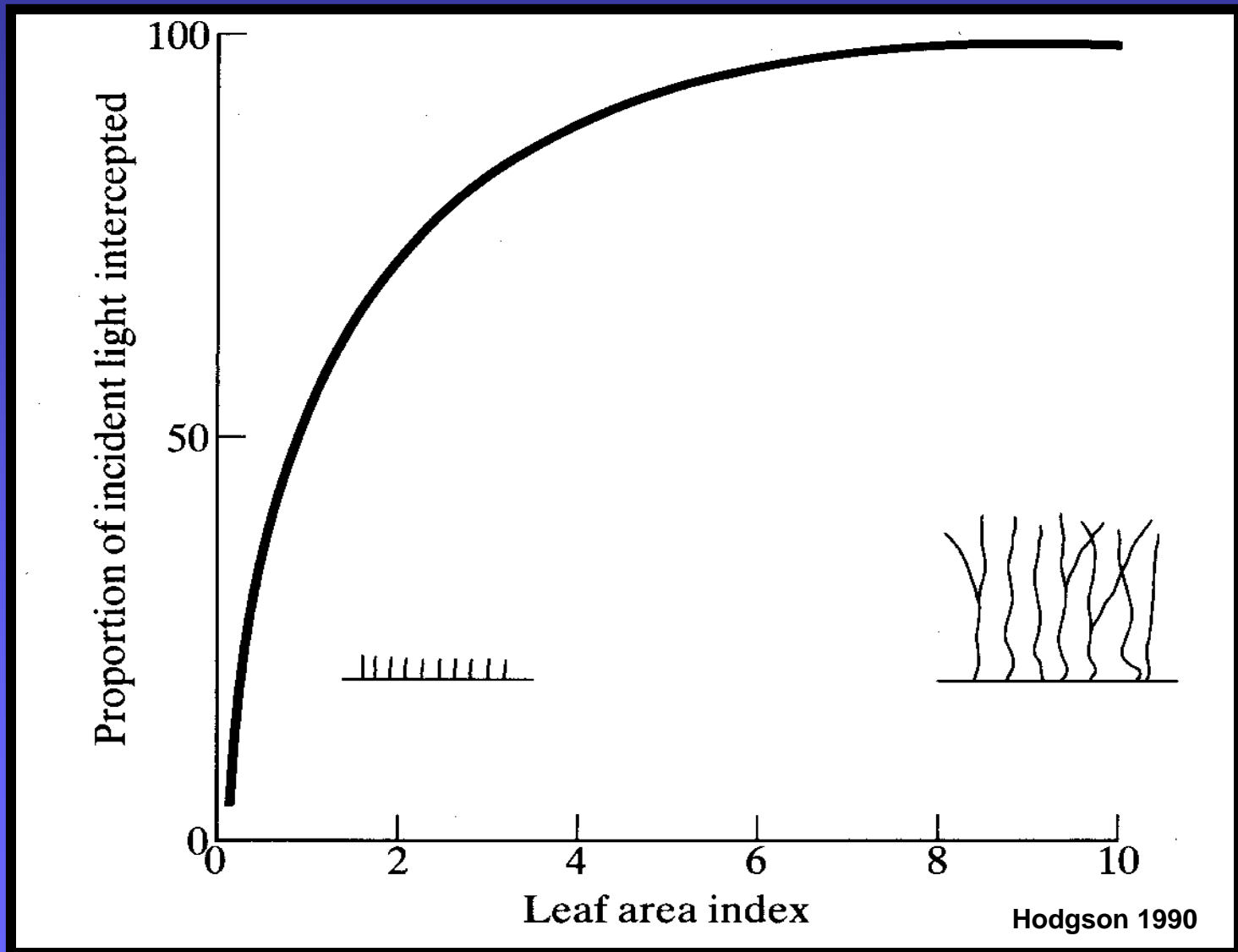


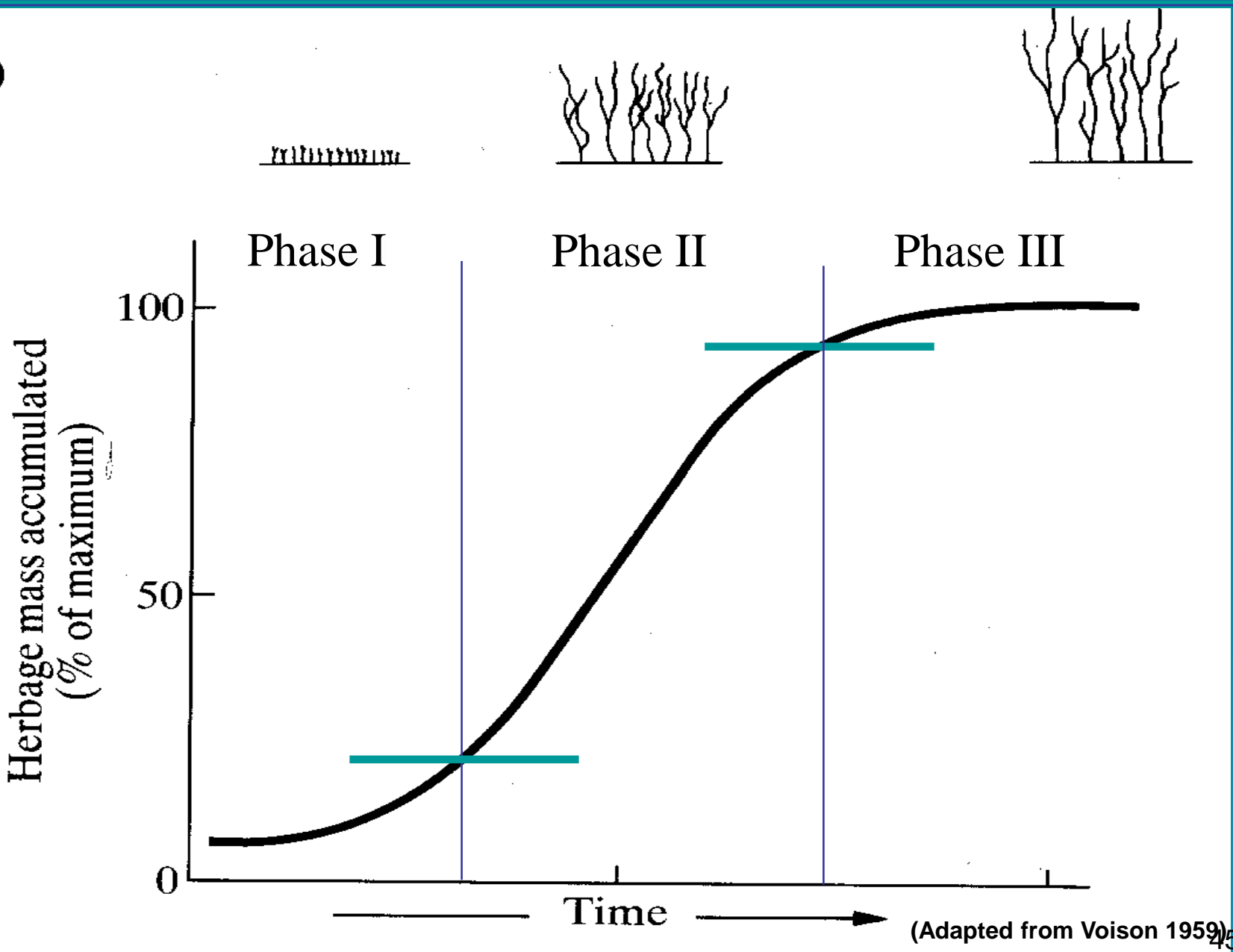
leaf area to produce energy for growth, maintenance, storage

Forage consumption








# Grazing Management

# Relationship of Light Interception to Amount of Leaf Area Present





# Management for below ground production and sustainability is important as Well.

	Top reduction	Single clipping
	90%	No root growth for 17 days. 60 percent of root growth on 33rd day.
	80%	No root growth for 12 days. 96 percent of root growth on 33rd day.
	70%	Approximately 48 percent of root growth after 17 days. 159 percent root growth on 33rd day.
	60%	Approximately 55 percent of root growth after 5 days. 192 percent root growth on 33rd day.
	50%	Averaged a 3 percent root growth stoppage for 14 days. 223 percent root growth on 33rd day.
	30%	117 percent root growth on 3rd day. 250 percent root growth on 33rd day.
	0%	129 percent root growth on 3rd day. 338 percent root growth on 33rd day.

# Root development is strongly related to frequency and extent of leaf removal



**Cut to 2"  
every week**



**Cut to 2"  
every 2 weeks**



**Cut to 2"  
every 4 weeks**

# Forage Maintenance

- Different forage species can tolerate different levels of grazing pressure
- Different forage species require different levels of nutrients and maintenance
- Hybrid bermudagrass generally requires a consistent moderate to high level of fertilizer, lime, and care to maintain a stand
- Bahiagrass once established is hardy and requires limited care and fertilization and liming
- Each manager must decide on the forages that are best adapted to their soils and fit with the objectives of their operation

# Summary of Key Points for Successful Grazing Management

- **Plant energy (carbohydrate) management:**
  - ensure continued root growth by not overgrazing
  - minimize plant use of carbohydrate reserves during critical times
- **Leaf area management:**
  - Maintain enough leaf area to carry on photosynthesis
  - enhances the microclimate for growth
  - improves rain interception
  - Avoid repeated, severe defoliation with no rest period

# Summary of Key Points For Successful Grazing Management

- **Livestock:**
  - optimize animal (gain/animal) and pasture performance (gain/acre)
  - consider genetics as they influence nutrient requirements
  - match the nutritive needs of livestock and management goals for livestock performance to forage quality
  - consider environmental effects on animal performance
  - Maintain adequate available forage levels to keep from decreasing intake
- **Grazing program:**
  - Dependent on the individual operation
  - Grazing distribution, season of grazing, and degree of use must all receive emphasis in the grazing program
  - Try to maintain forages in the “Phase II” stage of the growth curve

# Contact Info

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