Principles of Grazing Management Rotation, Rest, and Residual Height

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Grazing Management is an Old Science with New Technologies

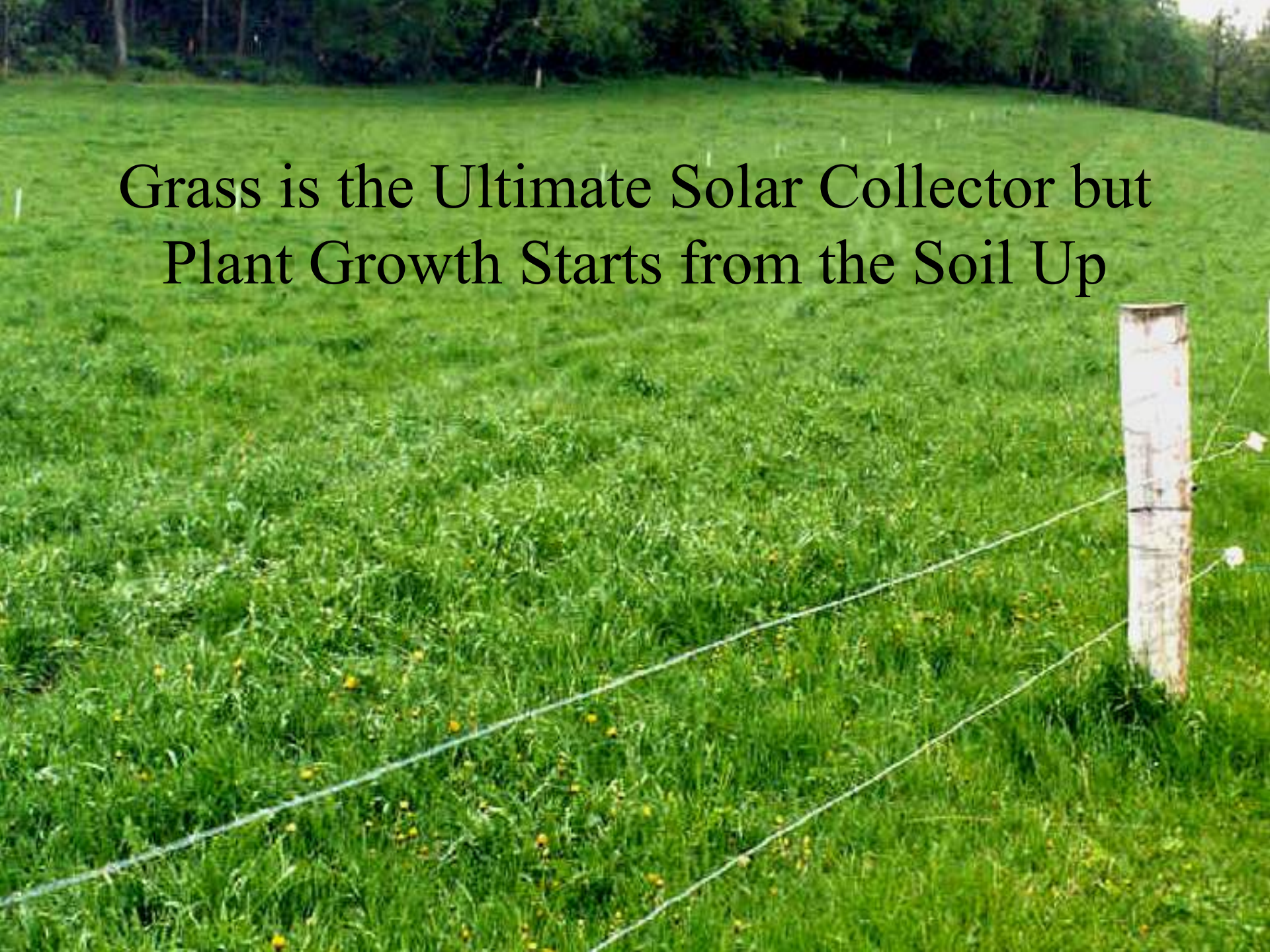
"To graze a permanent pasture closely from the time that growth begins until it ceases will soon result in decreasing its carrying capacity and eventually in depleting it."

Arthur Sampson - 1913

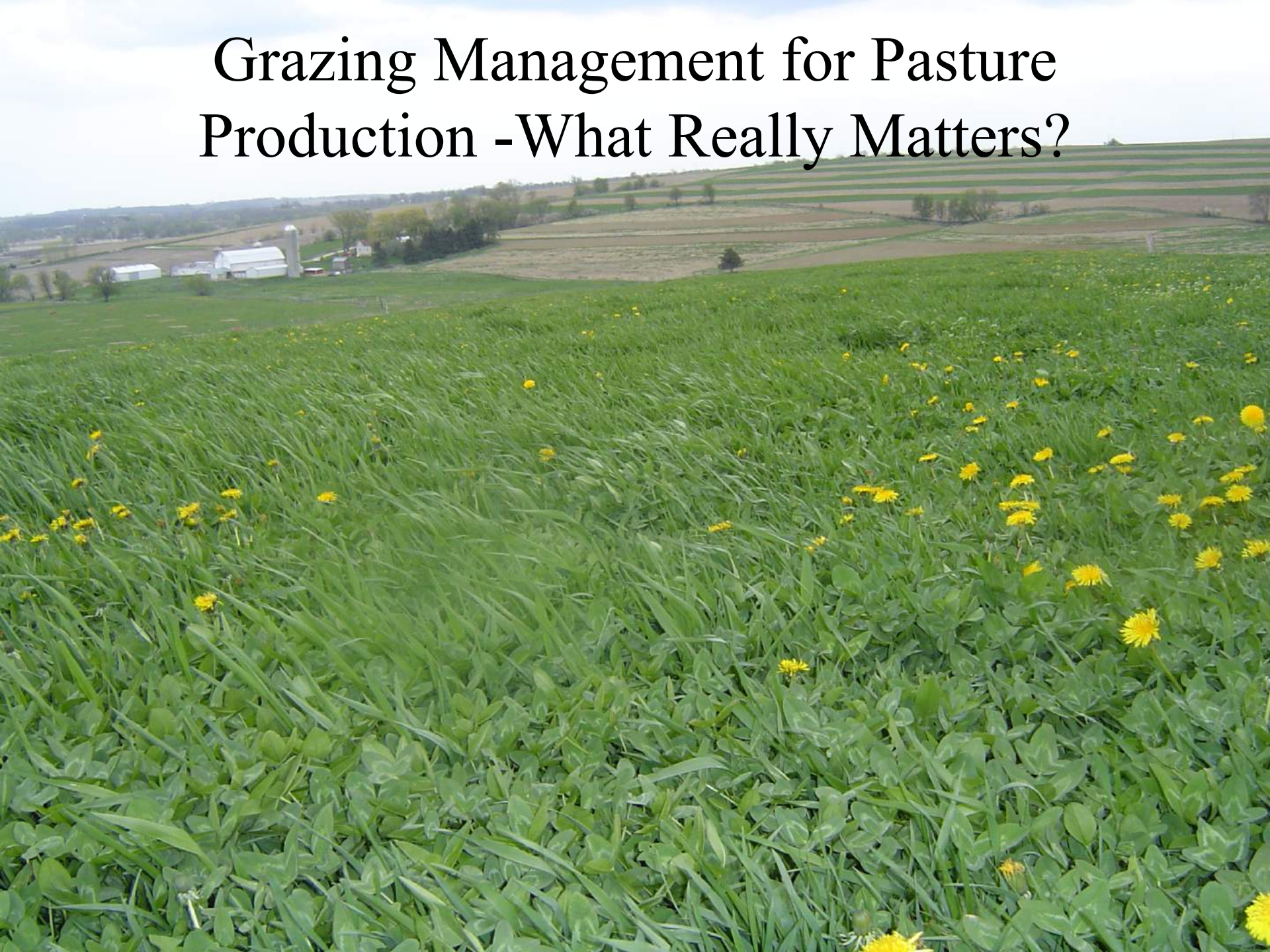
Grazing Success Depends on how the Soils/Forage/Animals are Managed

So What is New and Evolving

- Fence Technology Always Changing
- Animal Behavioral Knowledge
- Soil Fertility Needs
- Ability to Monitor Animal Performance and Pasture Production
- Animal Nutrition and Health Knowledge


Grass is the Ultimate Solar Collector but
Plant Growth Starts from the Soil Up

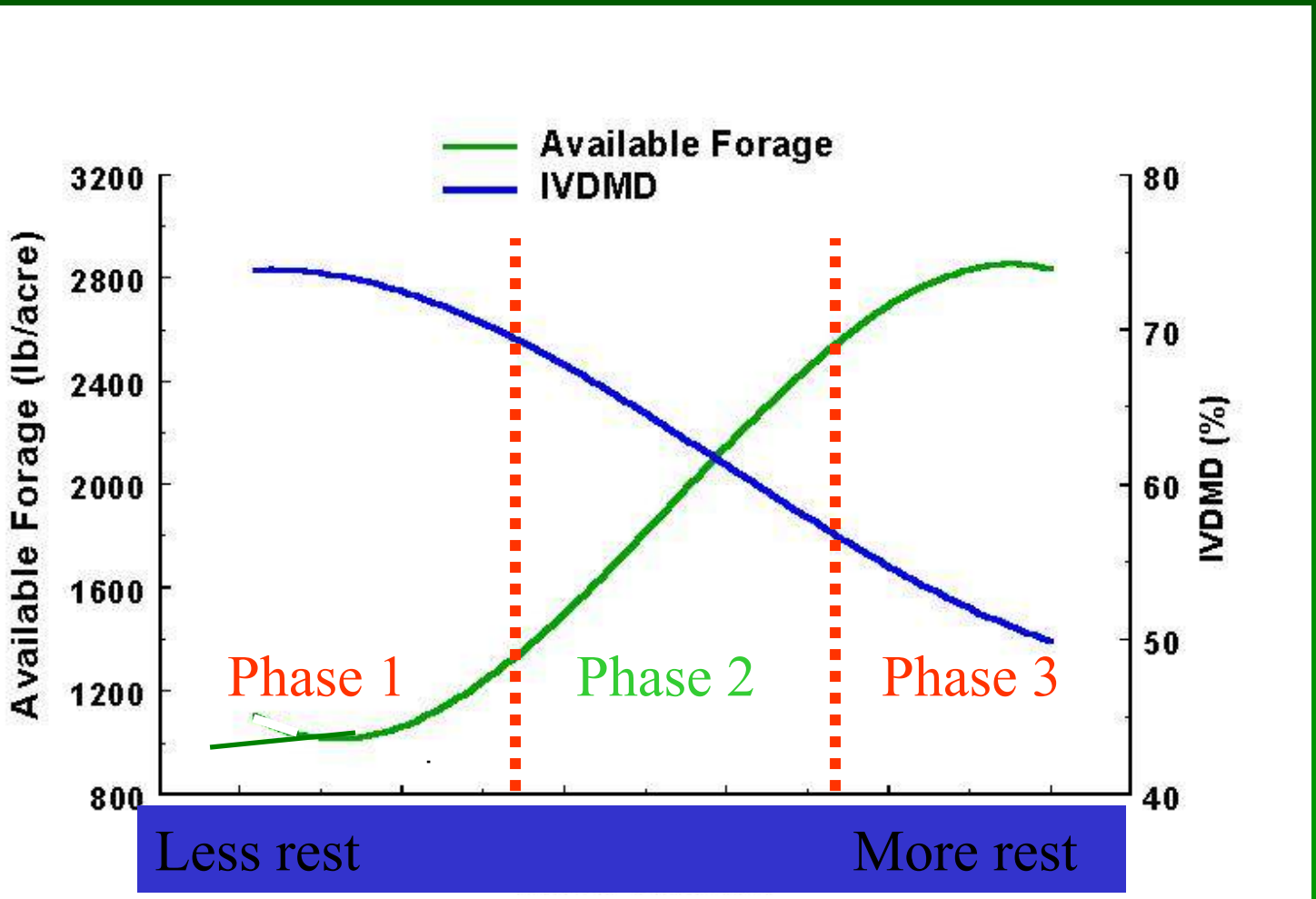
Grazing Management for Pasture Production -What Really Matters?




Only green, growing leaves carry out photosynthesis

Mature Plants do not Make a Good Solar Collector

Pasture growth and the Yield - Quality Compromise



Three phases of grass growth

A basic goal of grazing management is to keep as many acres in **Phase 2** as possible

Phase 1

Phase 2

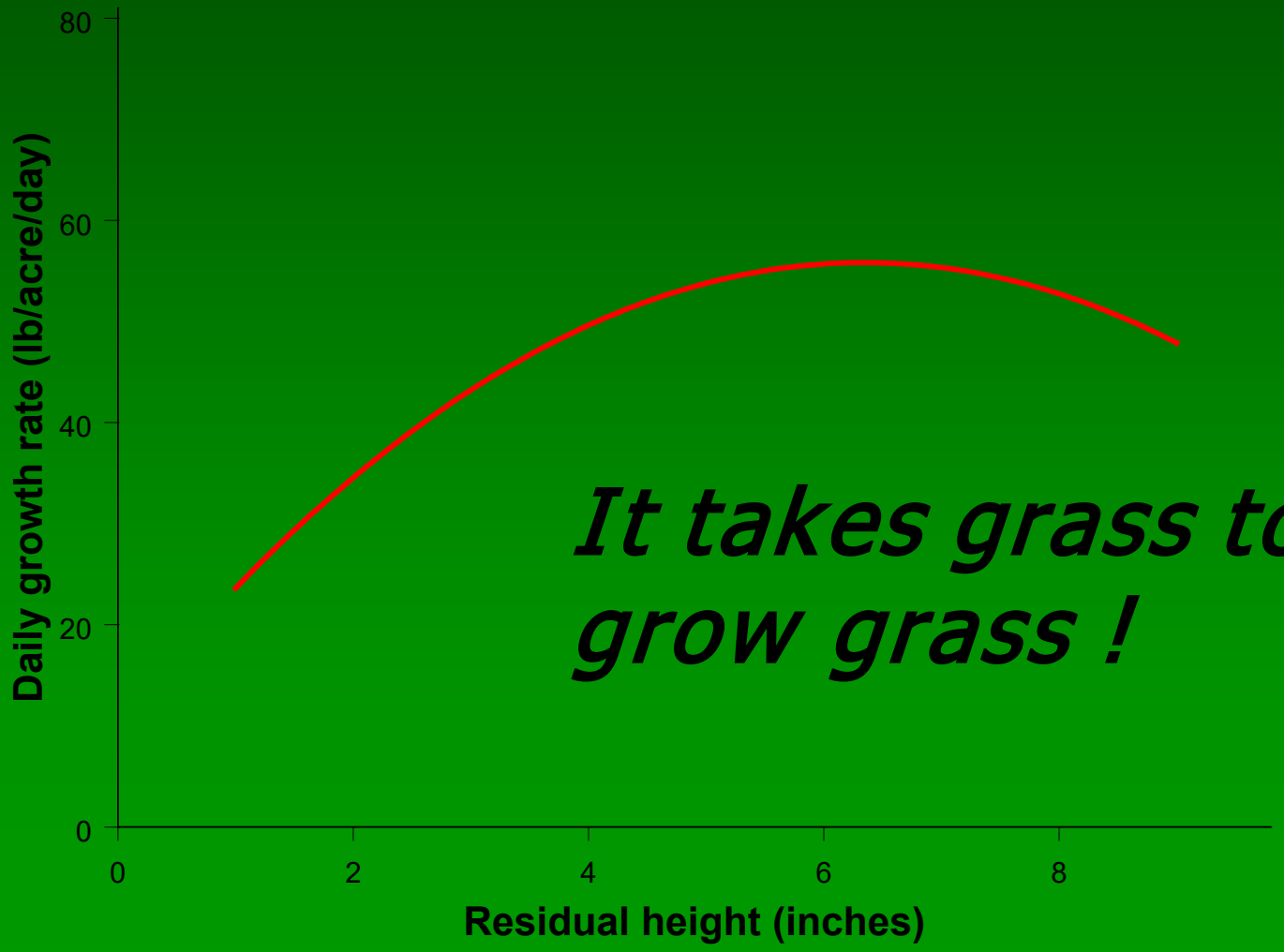
Phase 3

For most cool-season species Phase 2 is between about 4 and 12 inches height

< 12” pre-graze > 4” post-graze


Avoid grazing a pasture to Phase 1 !

Effect of grazing residual on pasture daily growth rate (MU-FSRC)



Orchardgrass Grazing Response

Dr. Ray Smith

Laura Schwer

Tom Keene

Methods

- **Two similar orchardgrass plants were chosen from greenhouse.**
- **Both were managed the same for 6 months:**
  - **Clipped ~once per month**
  - **Supplied with good fertility (N,P, K) and water**

Methods

- **Left plant simulates continuous grazing.**
  - **Initially clipped to a 1-inch height**
  - **Then clipped weekly for the next 4 weeks at a 1 inch height**
- **Right plant simulates rotational grazing.**
  - **Initially clipped to a 3.5-inch height**
  - **Then clipped again at 3.5 inches four weeks later**
- **Time lapse photography started at the beginning of the fifth week (day 29) for both plants.**

Day 1

24 hours after clipping)

1” Continuous 3.5” Rotational

Day 2

1” Continuous 3.5” Rotational

Day 3

1” Continuous 3.5” Rotational

Day 4

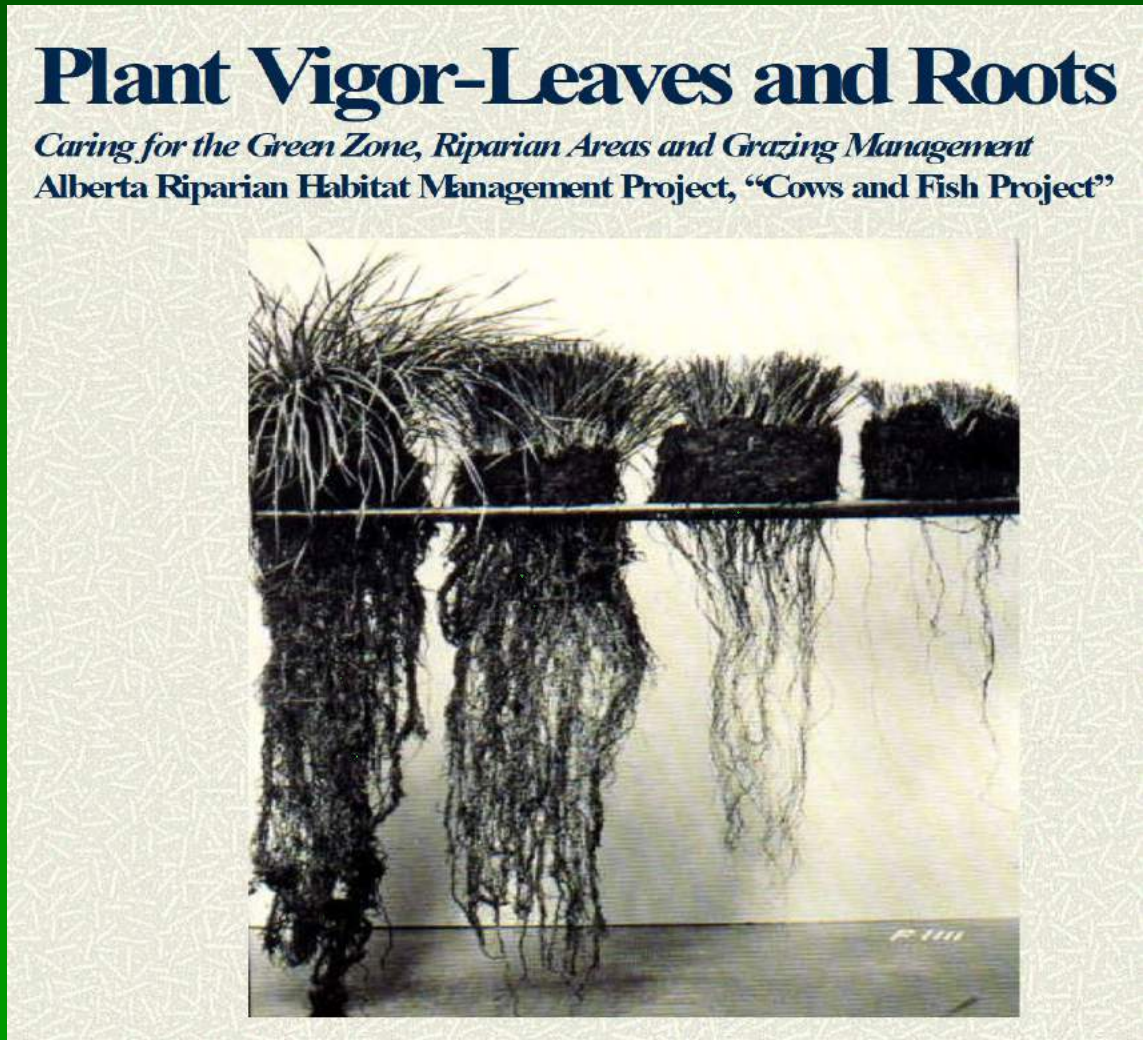
1” Continuous 3.5” Rotational

Day 5

1” Continuous 3.5” Rotational

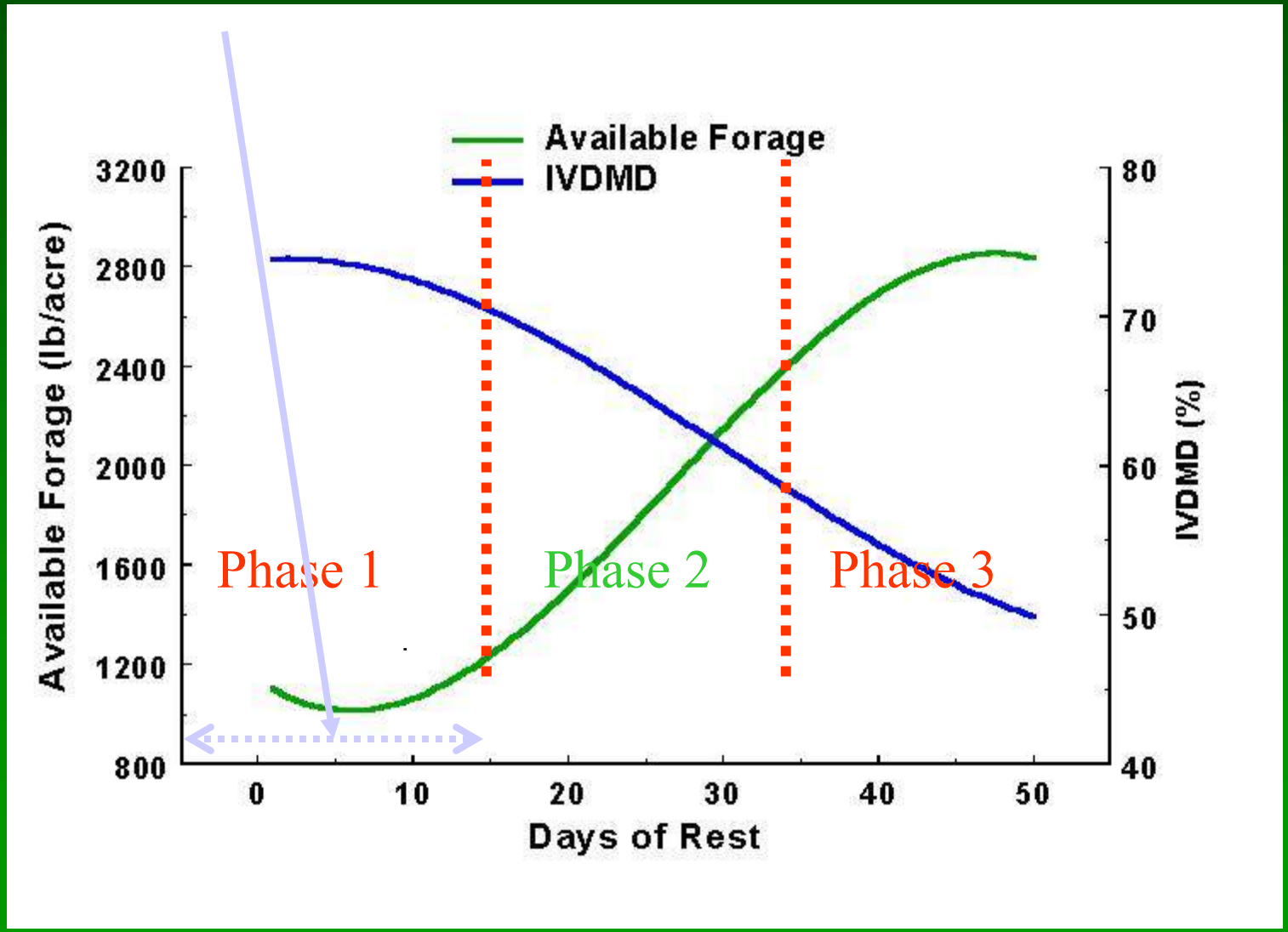
Grazing and root growth

- Repeatedly grazing the plant top short produces shortened root growth



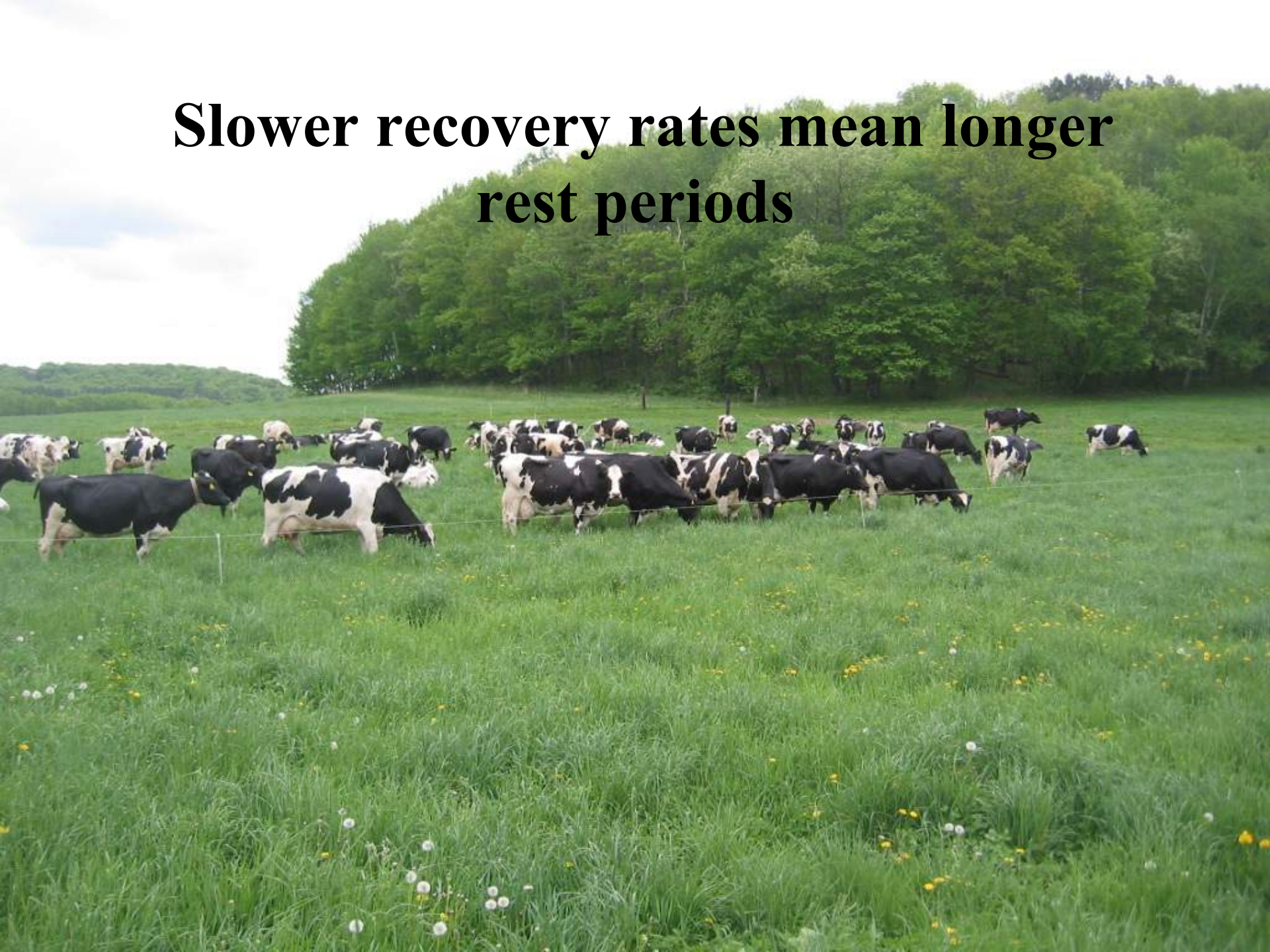
What you do the top of the plant affects the bottom of the plant

Grazing to Phase 1 residual may add 15 days to required rest



Effect of grazing residual on required rest period (MU-FSRC)

Slower recovery rates mean longer rest periods



The Effect of Residual and Rest on Seasonal Production

- In a 180 day growing season….
  - If grazing to 4 inch residual results in an average 30 day rest period ….
  - Then there are 6 harvests annually
  - If 1000 lb forage grazed in each cycle, each acre yields 6000 lb of grazed forage


The fear of wasting grass ….
…do we move them or do we leave them ?

The Effect of Residual and Rest on Seasonal Production

- In a 180 day growing season….
  - If grazing to 1-2 inches results in a 45 day rest period…..
  - Then there are only 4 harvests annually
  - If 1200 lb forage grazed in each cycle, each acre yields 4800 lb of grazed forage

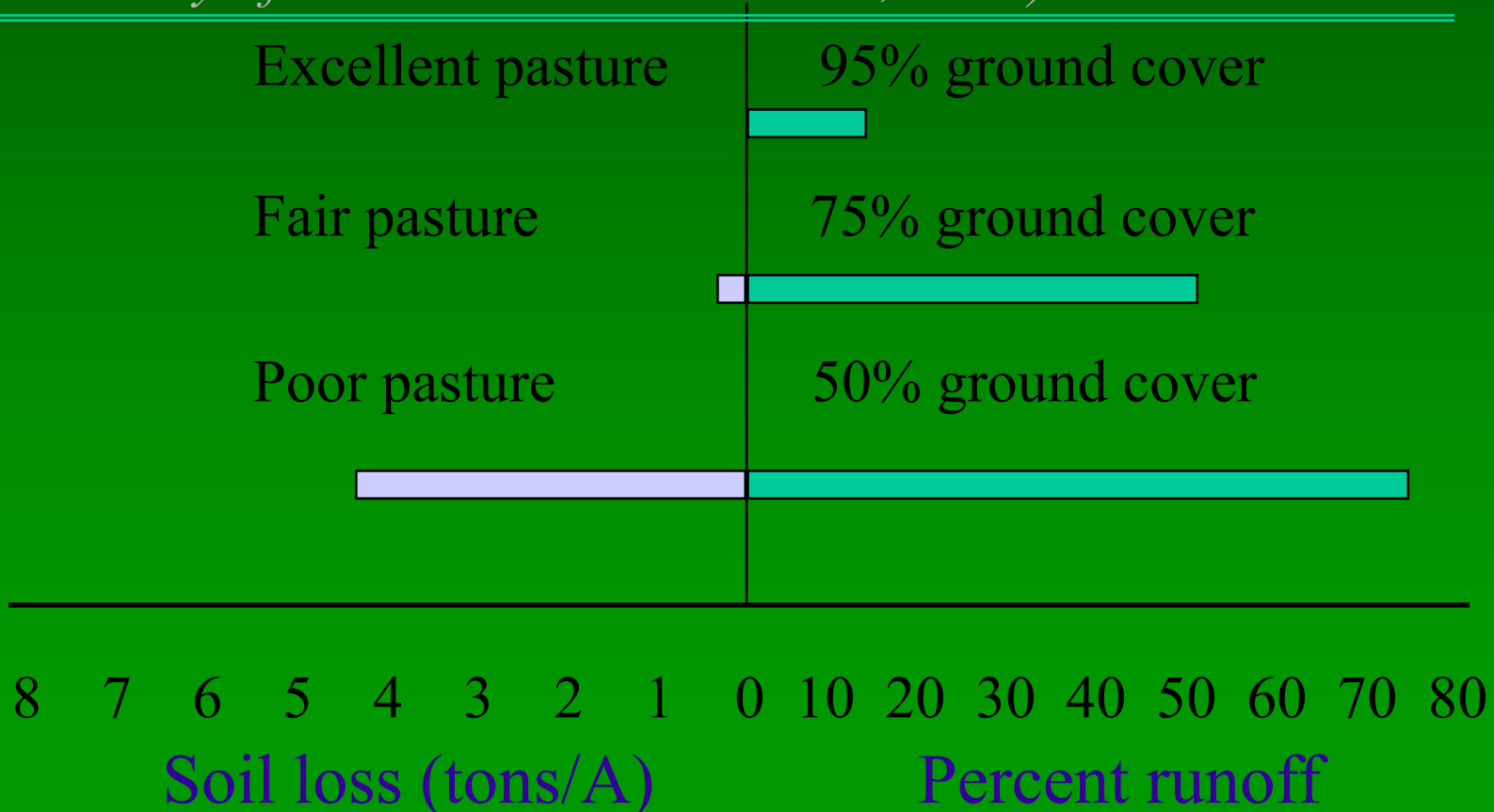

Grazing too short is the biggest cause of lost pasture production !

Longer rest periods mean fewer harvests annually resulting in lower annual yield

Infiltration and Runoff

3 inches of rainfall in 90 minutes, 10% slope, silt loam soil

(University of Nebraska & USDA-SCS, 1937)




What about the livestock ?


Intake on cool season pasture is 75 % availability… and 25 % quality.

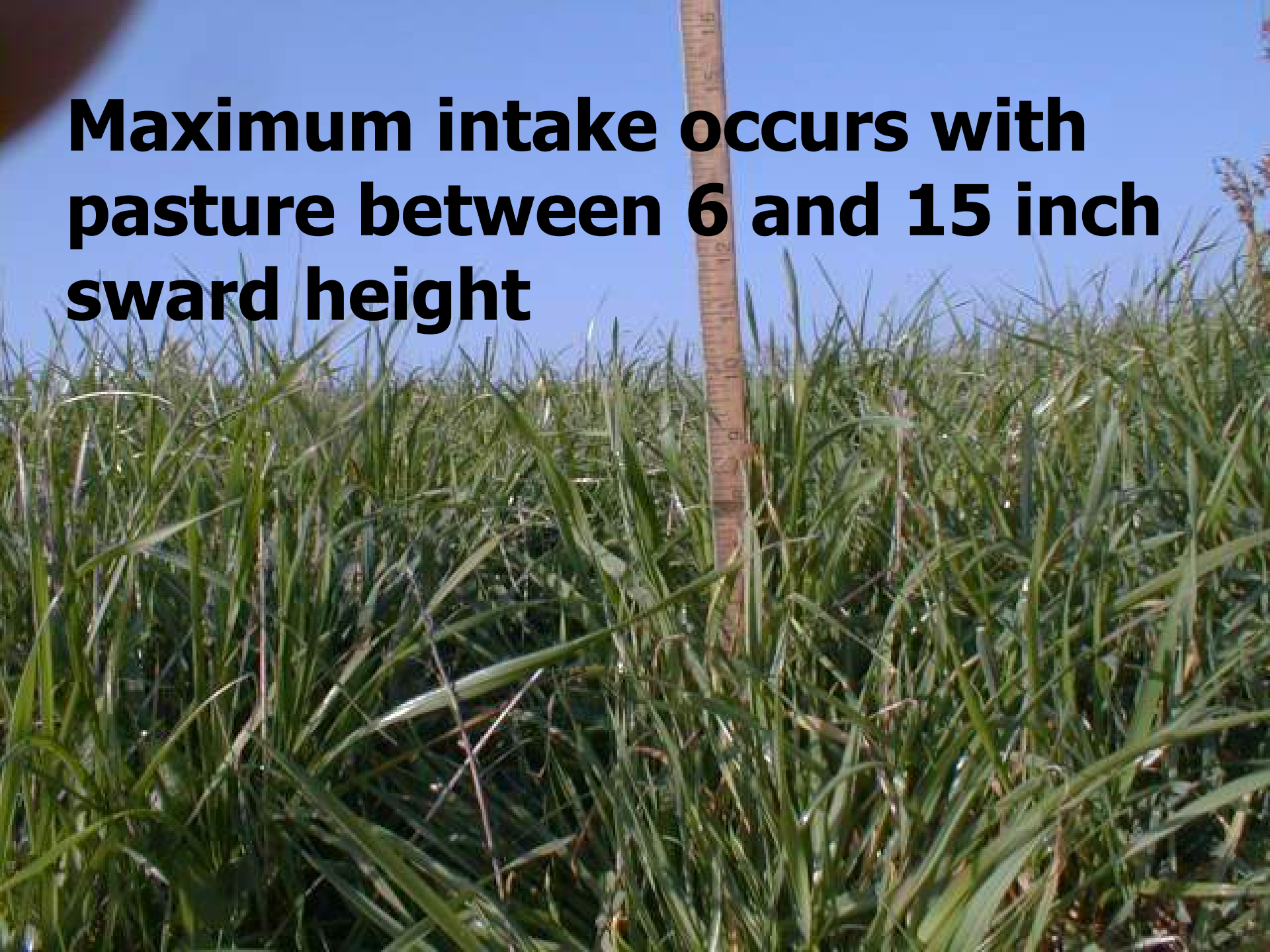
Voluntary Forage Intake

- Three controlling factors
  - Grazing time
  - Biting rate
  - Bite size

Voluntary Forage Intake

- Three controlling factors
  - –Bite size

    Is all we can control !


Maximum intake occurs with pasture between 6 and 15 inch sward height

Duration and Timing of Grazing: Residual affects just about everything

Nutrient Management on Pasture Consists of :

- Managing Nutrient Cycling
- Matching Animal and Forage Needs
- Managing Nutrient Distribution
- Mechanically Applying Nutrients if Needed

- This is Also Called “Managed Grazing”

Grazing Animals Return 80% -90% of the Nutrients they Consume back to the Soil Through their Urine and Feces

With the Right Grazing Management Fertility will be Maintained for a Long Period

- Minimizes, Not Eliminates the Need for Nutrient Inputs
- Nutrients Exported from the Soil Pool Need to be Replaced

Nutrient Losses From Pasture

- N, P, and K Exported in Hay, Meat, of Milk
- Nitrogen is Lost to the Atmosphere
- Runoff and Leaching is Minimal

Estimated Removal of N, P, and K From A Pasture For Difference Operations (lbs/ac)

Operation	P2O5	K20	N
Hay (3 ton yield)	34 lbs.	145 lbs	150 lbs
Pasture-based Dairy (no conc.)	27 lbs.	22 lbs.	67 lbs.
Imported Conc. Dairy	58 lbs. imported	91 lbs. imported	118 lbs. imported
Cow/Calf	7 lbs.	.83 lb	10 lbs.
Stocker	14 lbs.	1.6 lbs.	20 lbs.
Dry Cows	0	0	0

Nitrogen Is the Limiting Nutrient in Pastures

On a pasture-based dairy 70 lbs./ac. is lost through milk and meat, and another 70 lbs. is lost from volatilization to the atmosphere, a net loss of 140 lbs.

A 30 to 40 Percent Stand of Legumes can Supply 30 to 50 Pounds of Nitrogen per Year to the Grasses in the Pasture.

Nitrogen Fertilization of Pastures

- Make Sure other Nutrients, i.e. Phosphorous and Potassium are at Optimum Levels
- Maintain Legumes at 30-40 % of Stand
- Applying Nitrogen can Increase Grass Production Yields Dramatically, However, the Legumes, will decline.

Losses of Phosphorous and Potassium

- P Losses from Erosion, Runoff, and Leaching are Minimal (less than 1 lb./ac) on Pasture
- Potassium is Lost from Leaching, Especially on Course Textured Soil
- Potassium is Fixed in Heavy Clay Soils

Managed Grazing Requires that Animal Numbers Are Properly Balanced with Forage Availability

- Match Animal Forage Needs with Forage Production to Determine Carrying Capacity.

- Percent of Total Daily Diet from Pasture Should be Equal to Time Spent on Pasture.

Proper Stocking-continued
Feed and Forage Balance

How can we plan for Proper Stocking?

- Inventory total forage
- Determine grazable forage
  - The amount of grazable forage present determines the proper stocking rate for each pasture.

Proper Stocking-continued
Stocking Conservatively

How can we plan for Proper Stocking?

- Stocking conservatively is critical in managing for drought conditions – leave higher than normal residuals
- By adjusting stocking rates to current forage production, a farmer ensures that the number of animals grazed will not harm the pasture resource.

A Simple Example:

One Cow for 100 days

Forage is balanced

- Long duration
- Season long timing
- Low intensity
- Poor manure distribution
- Properly stocked (balanced)

100 Cows for 1 day

Forage is balanced

- Short duration
- Single growth stage timing
- High intensity
- Good manure distribution
- Properly stocked (balanced)

The forage consumed per animal is the same. Are the effects the same? No. How does the length of rest differ? How will the plants be affected?

Which of these is continuous grazing?

What indicates that?

Is that bad?

Goals for grazing management?

- To make sure that pastures are only grazed to a certain stubble height?
- Good animal distribution in pastures?
- To make sure the stocking rate matches our forage inventory?

What Do I Leave You With?

- Nitrogen is the Most Important Nutrient
- Residual is the most important decision relative to pasture production
- Proper stocking rate and duration is the most important decision relative to residual
- Animal distribution in the most important decision relative to long term fertility and pasture efficiency.

Management Makes a Difference!

The End

USDA UNITED STATES DEPARTMENT OF AGRICULTURE