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Why do we need pastures?

Environmental Benefits

Pasture Reduces Soil Loss Compared to Continuous Corn or Beans up to 93%

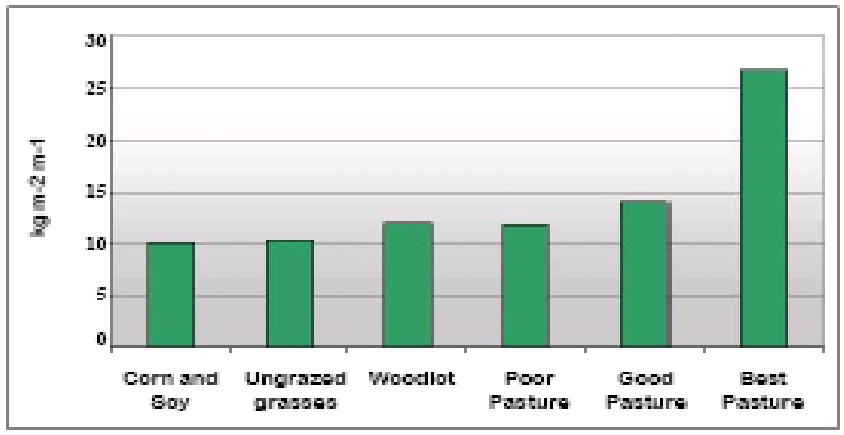
Crops	% Reduction
Mixed grain or winter wheat	40
Rotation 1 yr corn, I yr grain, 2 yrs hay pasture or 3 yrs corn, 3 yrs hay	60
Rotation 2 yrs corn, 4 yrs hay pasture	70
Hay pasture	87
Permanent pasture	93

(Ontario Ministry of Agriculture and Food, Robert P. Stone and Neil Moore, Fact Sheet 95-089)

Pasture reasons..

Grazed pasture is the best land for storing carbon.

Growing plants take carbon dioxide out of the air and "fix" it into the soil as organic matter. The more carbon dioxide that's taken out of the air, the lower the rate of global warming. Until recently, forested land and ungrazed grasslands were thought to be the best "sinks" or store houses for carbon. The study illustrated below concluded that well managed grazed pasture may be far better.



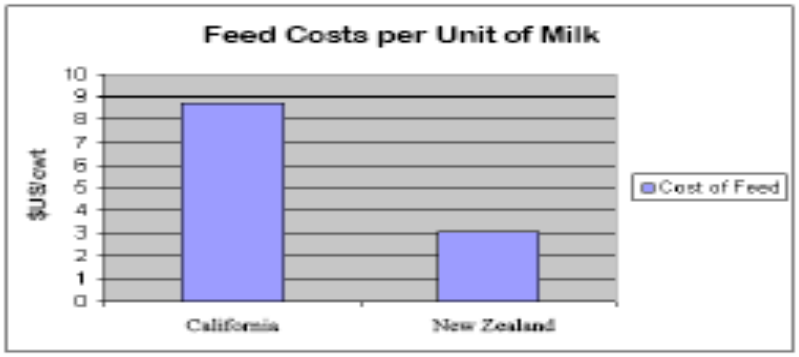
"Soil Organic Carbon in fields of switch grass and row crops as well as woodlots and pastures across the Charlton Valley, Iowa." Final Report. Lee Burras and Julie McLaughlin, Iowa State University, January 26, 2002.) From "Eatwild.com" website

Why pastures?

Farm Profitability

Keeping dairy cows on pasture lowers the cost of milk production.

Small dairy farmers are going bankrupt by the thousands, largely due to declining milk prices. Keeping the cost of production low is one of the keys to staying solvent. The least expensive feed ingredient is fresh pasture. The graph below shows the difference on feed costs between California (where most of the dairy cows are fed grain concentrate) and New Zealand (where virtually all the cows are pasture raised) Raising cows on pasture may allow small dairies to stay in business.



(Data Source: Dairy Research & Development Corporation, Australia

Pastures are Maine's "Unfair Advantage"

Why Do We Need Our Pastures?

O'Donnell's Farm, Monmouth, ME

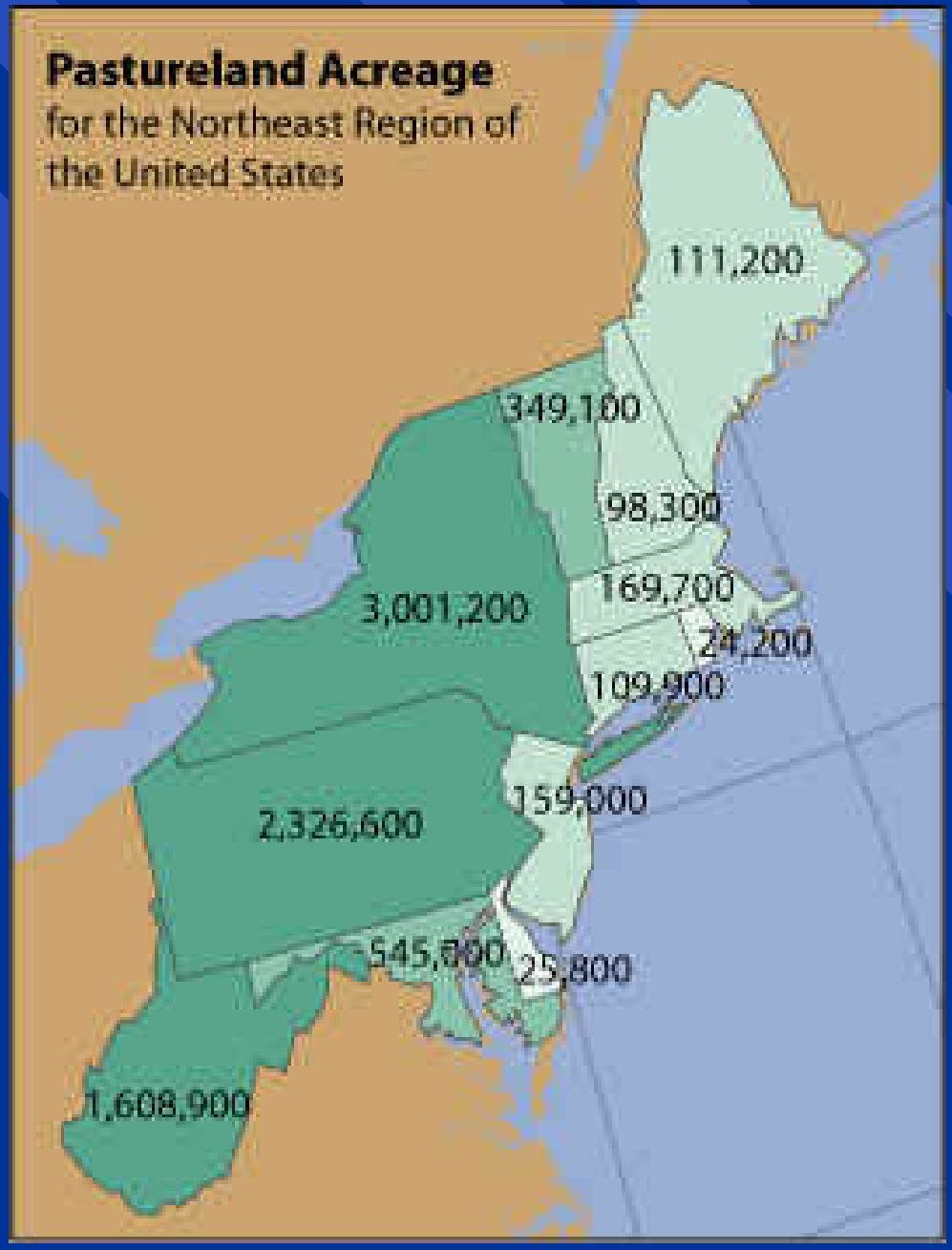
- Reduce Soil Erosion
- Increase Farm Profitability
- Maintain Rural Character
- Reduce Fossil Fuel Use
- Produce Livestock Locally
- Lower Animal Feed Costs
- Diversify Crop Farms
- Produce Nutritious Food

From Maine Grass Farmers Network

http://extension.umaine.edu/livestock/mgfn/

Pasture systems…

- Offer low capital cost methods of feeding livestock
- Offer potential for small and middles sized farms to stay profitable
- Offer opportunities for integrated veg/livestock operations
- Help maintain open space
- Produce quality milk/meat products


Pastureland Acreage
for the Northeast Region of
the United States
111,200
349,100
98,300
169,700
3,001,200
24,200
109,900
159,000
2,326,600
545,800
25,800
1,608,900

Forage and Grazing Opportunities

Forage Quality

"Well managed pastures provide high quality feed"

- Feed costs make a substantial dent in operating costs on livestock farms
- Supplement (grain) feeding will never substitute on an equal basis for quality forage
- Growing cool season grasses should be our "unfair advantage"

Pasture resources

Soil Grass and Cancer by Andre Voisin

Northeast Pasture Consortium www.umaine.edu/grazingguide

Greener Pastures on Your Side of the Fence, Bill Murphy Source: Arriba Publishing, Middle Rd. , Colchester, VT 05446 1-800-639-4178

University of Vermont Pasture site (Sid Bosworth)

http://www.uvm.edu/pss/vtcrops/?Page=pasturegrazing.html#Species

Maine Pasture Management Home Study Course

http://www.umaine.edu/umext/pasture/

National Forage & Grasslands Curriculum

http://forages.oregonstate.edu/nfgc/default.cfm

Equine pasture resources

http://njaes.rutgers.edu/horsepastures/

NRAES Pasture Series "Pasture Based Livestock Production" NRAES 171,172,173 and 174 http://www.nraes.org/

Forage types and definitions.

Vegetation Terms	Definitions
Forage	Edible parts of plants, other than separated grain, that can provide feed for grazing animals, or that can be harvested for feeding. Includes browse, herbage, and mast.
Browse	Leaf and twig growth of shrubs, woody vines, trees, cacti, and other non-herbaceous vegetation available for animal consumption.
Herbage	The biomass of herbaceous plants, other than separated grain, generally above ground but including edible roots and tubers.
Forb	Any herbaceous broadleaf plant that is not a grass and is not grass-like.
Legume	Members of the plant family Fabaceae.
Grass	Members of the plant family Poaceae.

Other pasture terms

- Sward—all the plants in the pasture
- Stocking rate—number of grazing animals per acre over the grazing season
- Stocking density—number of grazing animals per acre at any given point in time

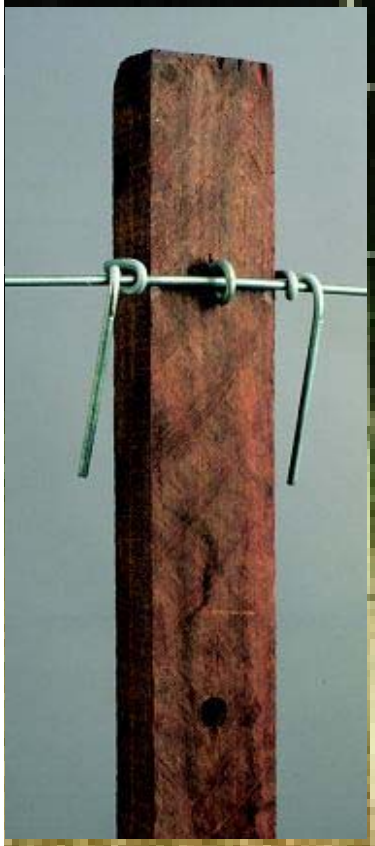
Grazing habits of Livestock

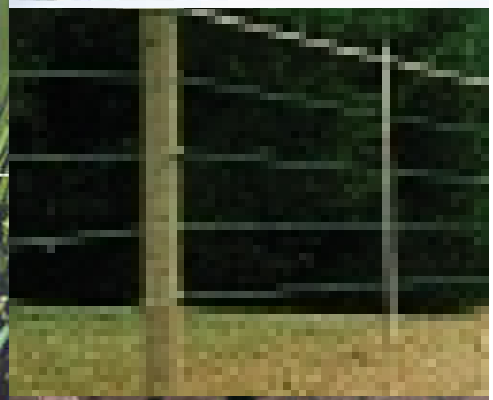
- Cattle—Graze to within 1" of soil but only if forage is low. They "spot" graze if given the opportunity
- Sheep—Can be very selective. Will bite off tillers as close as $\frac{1}{4}$ inch.
- Horses- Bite off plants at ground level. They spot graze routinely
- Goats—Don't graze close to ground. Graze seed heads and stalks that other livestock will not eat. They do not spot graze and will graze a canopy from top to bottom.

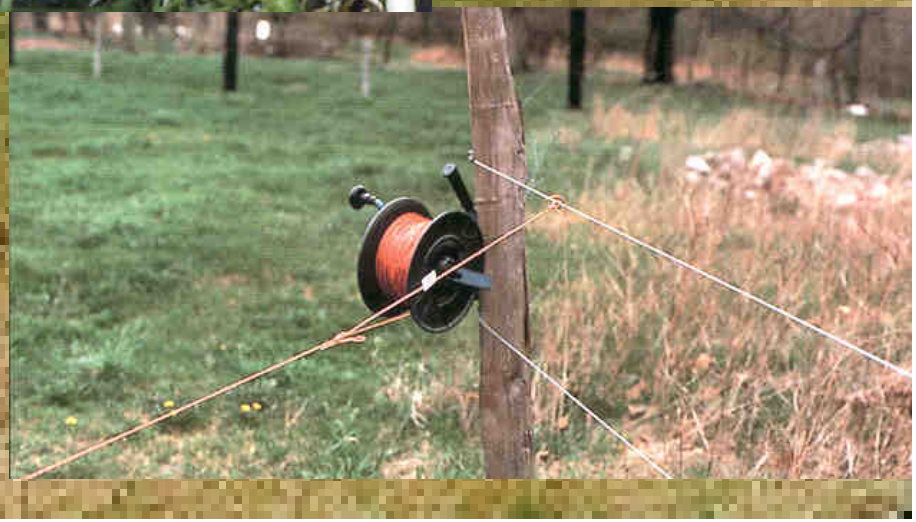
Types of pasture systems

- Continuous
- Rotational
- MIG (Managed Intensive)
- Creep
- Strip
- Mob
- Mixed species

Consider the New Fencing Technology







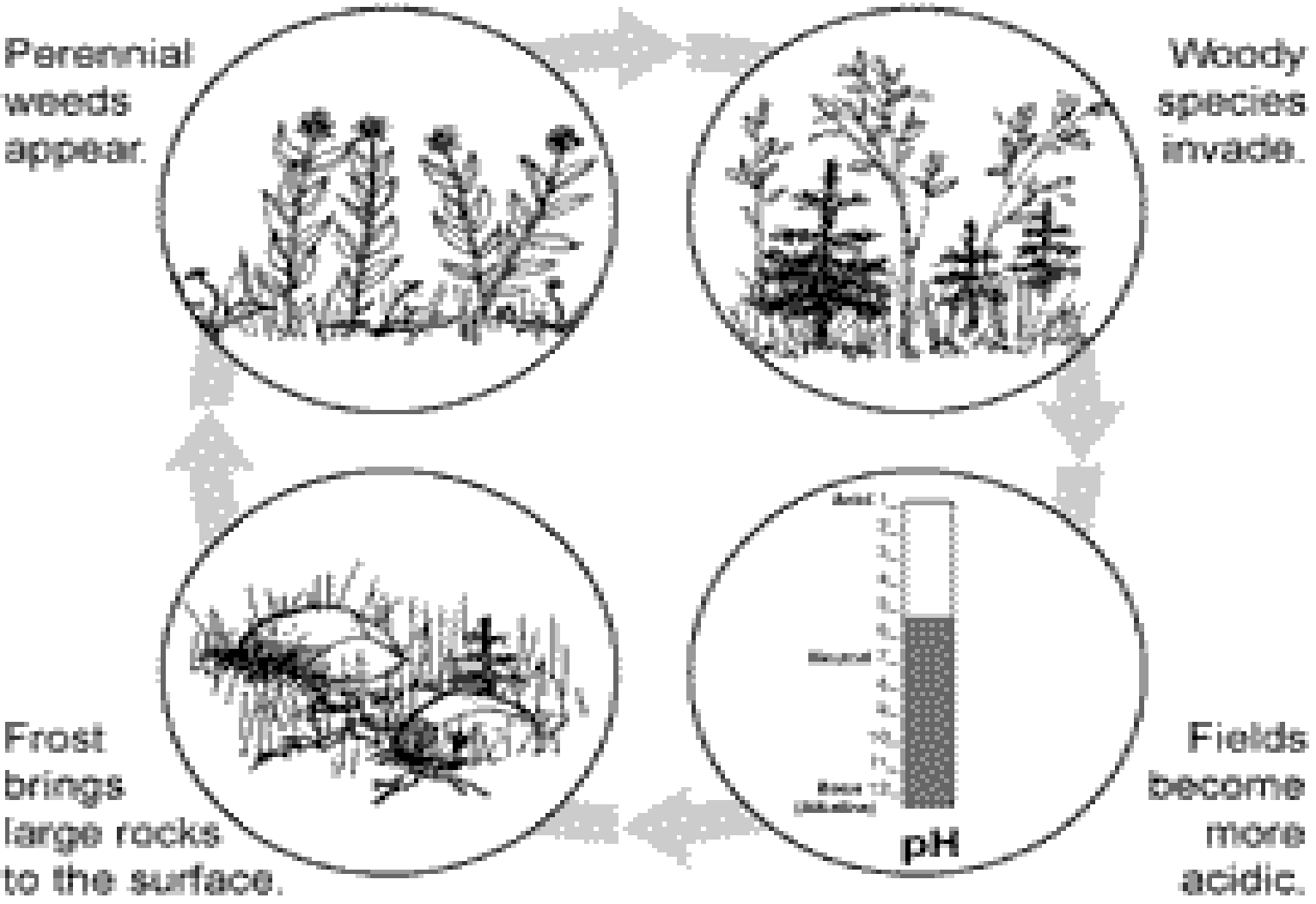
Common fencing Mistakes

- Not buying a large enough energizer
- Believing the "miles of fence" claims on the energizer
- Asking the fence to do more than what is designed for..
- Inadequate training for animals
- Not enough grounding
- Allowing bare copper wires or ground rods to touch galvanized steel wires, staples or ground rods

Can't Do Without This:

- 10 - 15 cores/area, mix in bucket

What Happens When Fields Are Neglected



Forage Facts

This Old Hayfield:
A Fact Sheet on Hayfield Renovation

University of Maine Cooperative Extension
Bulletin #2491

Traditional Pastures are often "Continuously Grazed"

This usually means:

- Lower yields
- Serious weed pressure
- Erosion problems
- General "poor" management

Grazing Efficiency

Continuous grazing: 30 – 50 %

Crashing Pasture Syndrome

- Poor yield
- Low quality
- Weedy

Is it over grazing or under grazing?

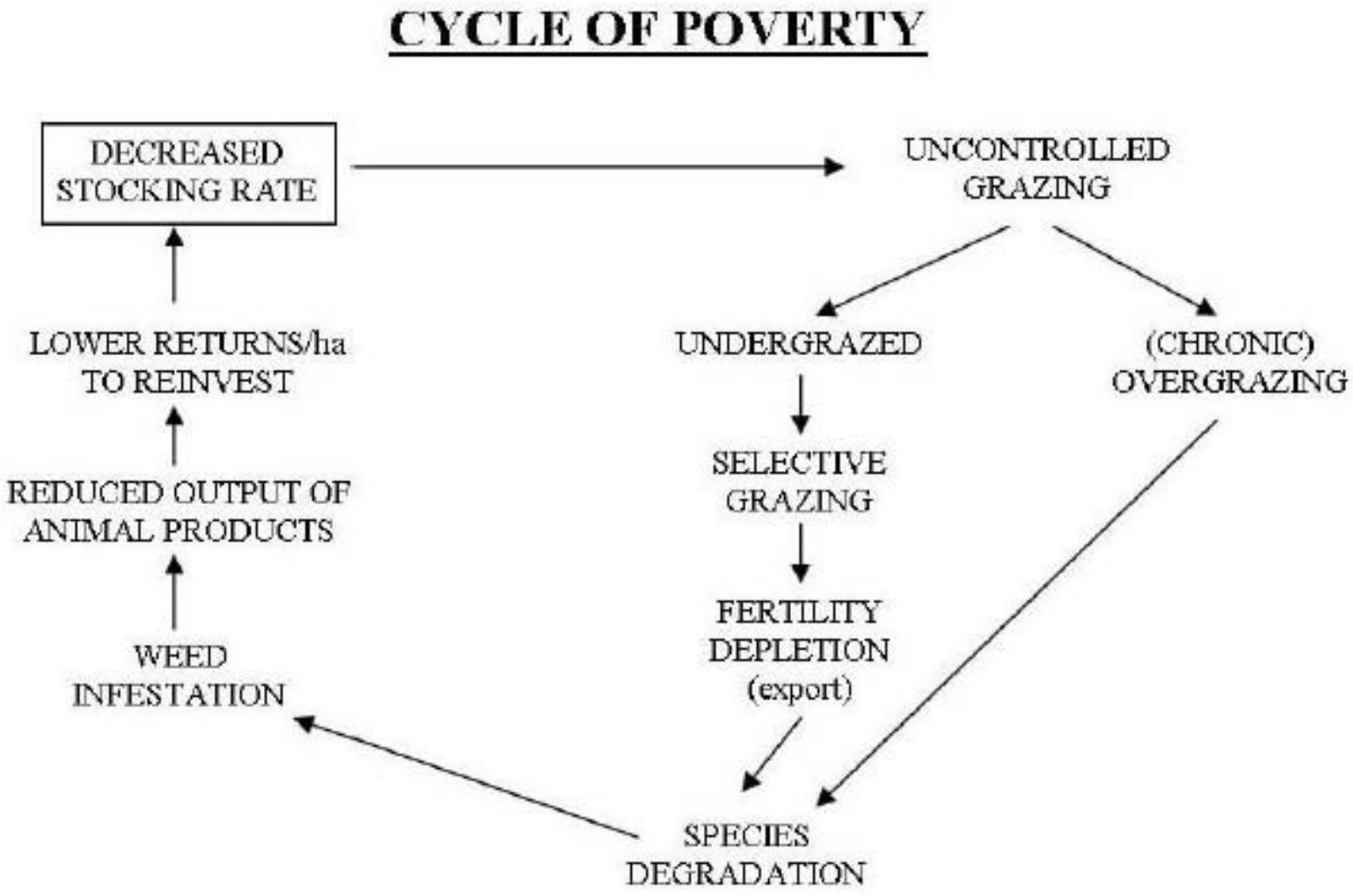


Figure 1.5 How uncontrolled grazing contributes to the "Cycle of Poverty".

Adapted from Thomas and Goit 1986

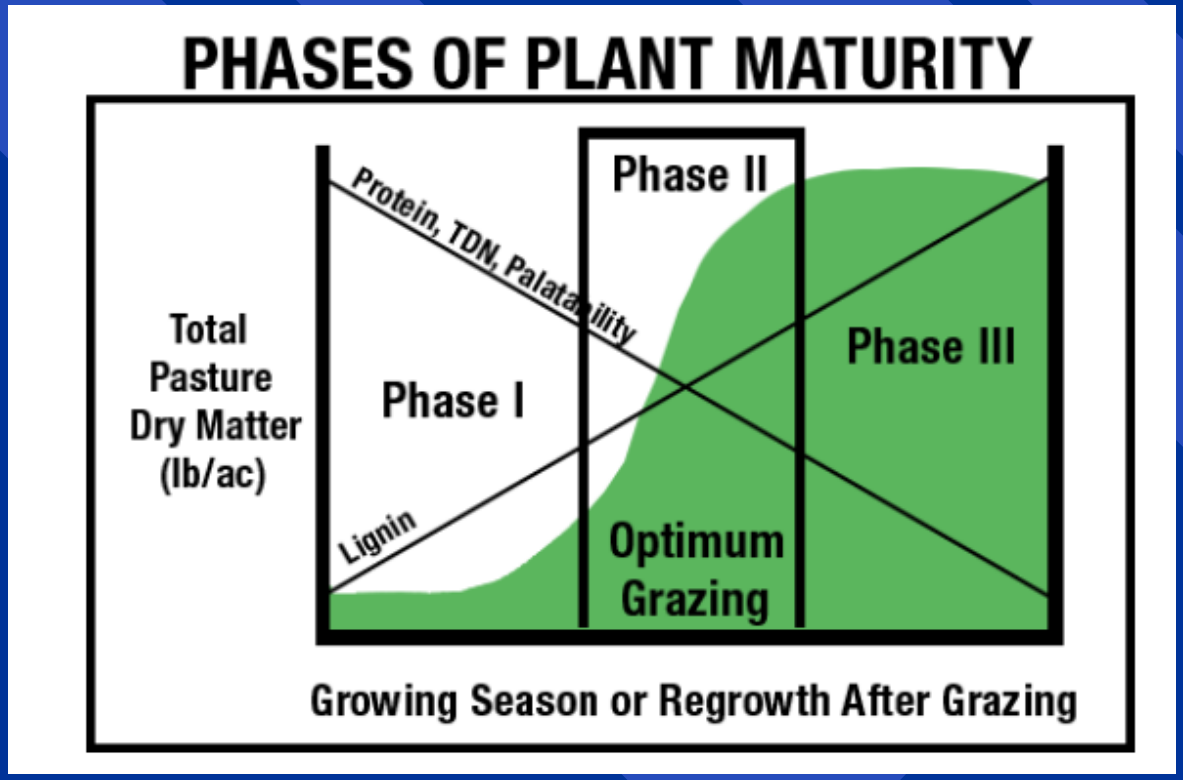
Getting the most out of your pastures

- Step 1: Build a better solar panel


When you buy an acre of land,
you buy 43,560 sq ft of solar panel


Only green, growing leaves
carry out photosynthesis
It takes grass to grow grass !


Bare soil does not make
a good solar panel !


PHASES OF PLANT MATURITY
Phase II
Protein, TDN, Palatability
Total
Pasture
Dry Matter
(lb/ac)
Phase I
Phase III
Lignin
Optimum
Grazing
Growing Season or Regrowth After Grazing

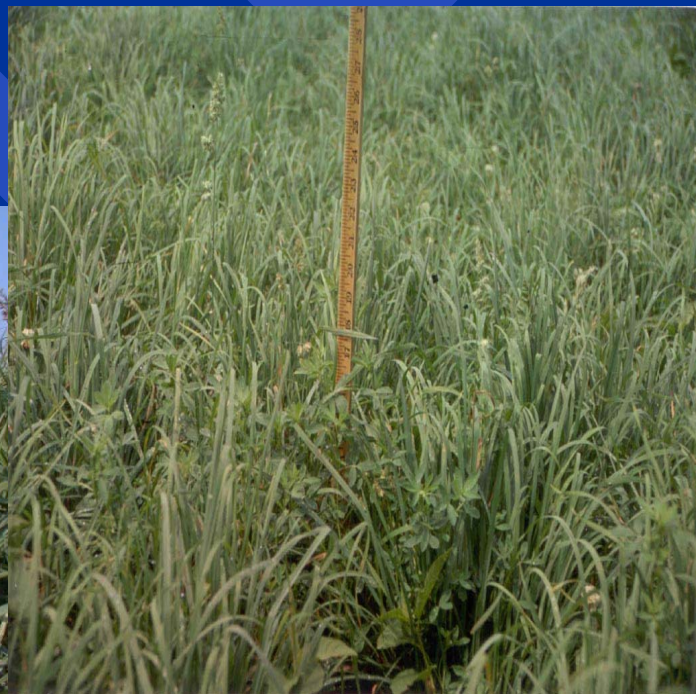
Three phases of grass growth

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

Phase 3

Phase 2

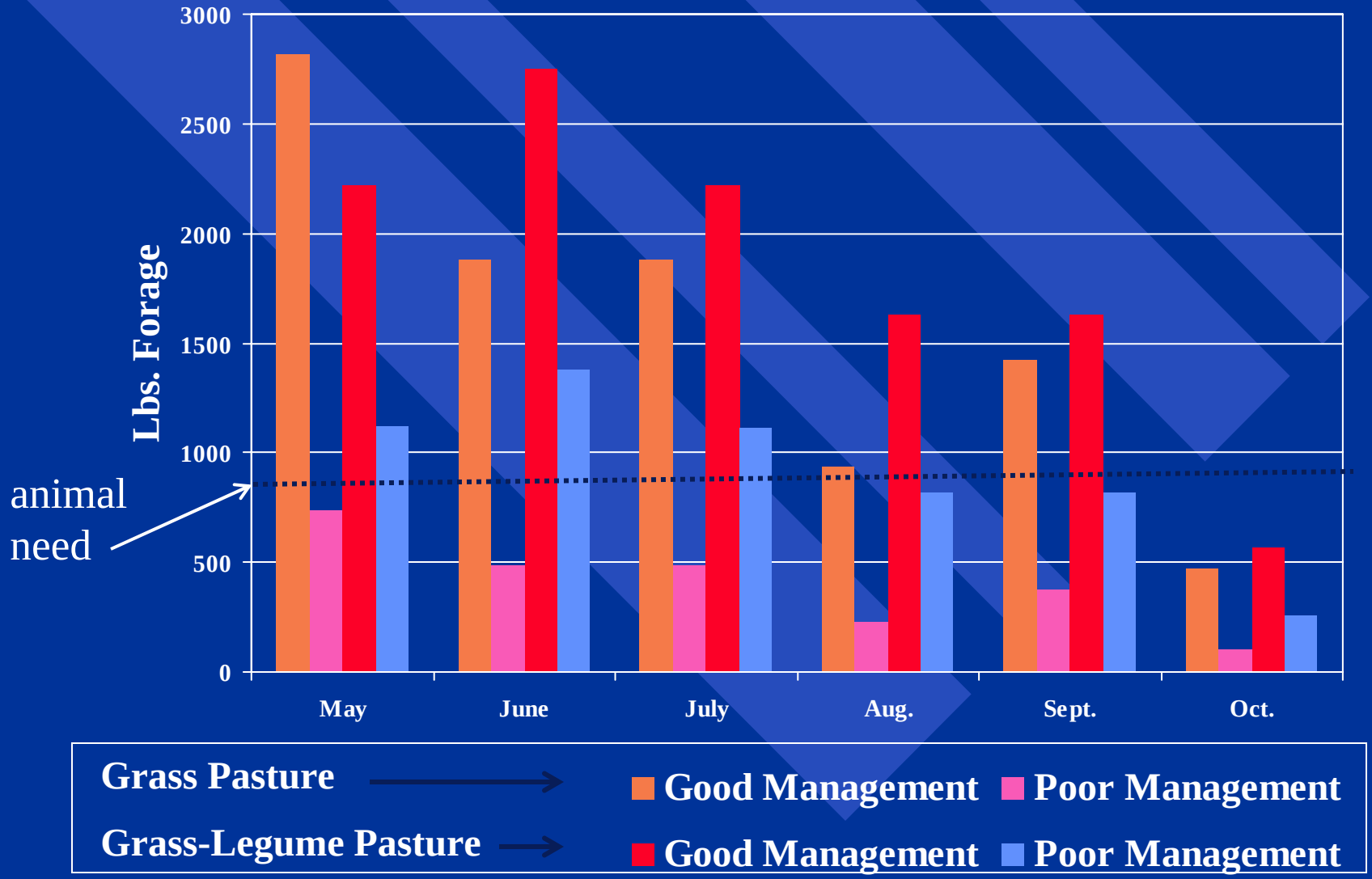
Phase 1



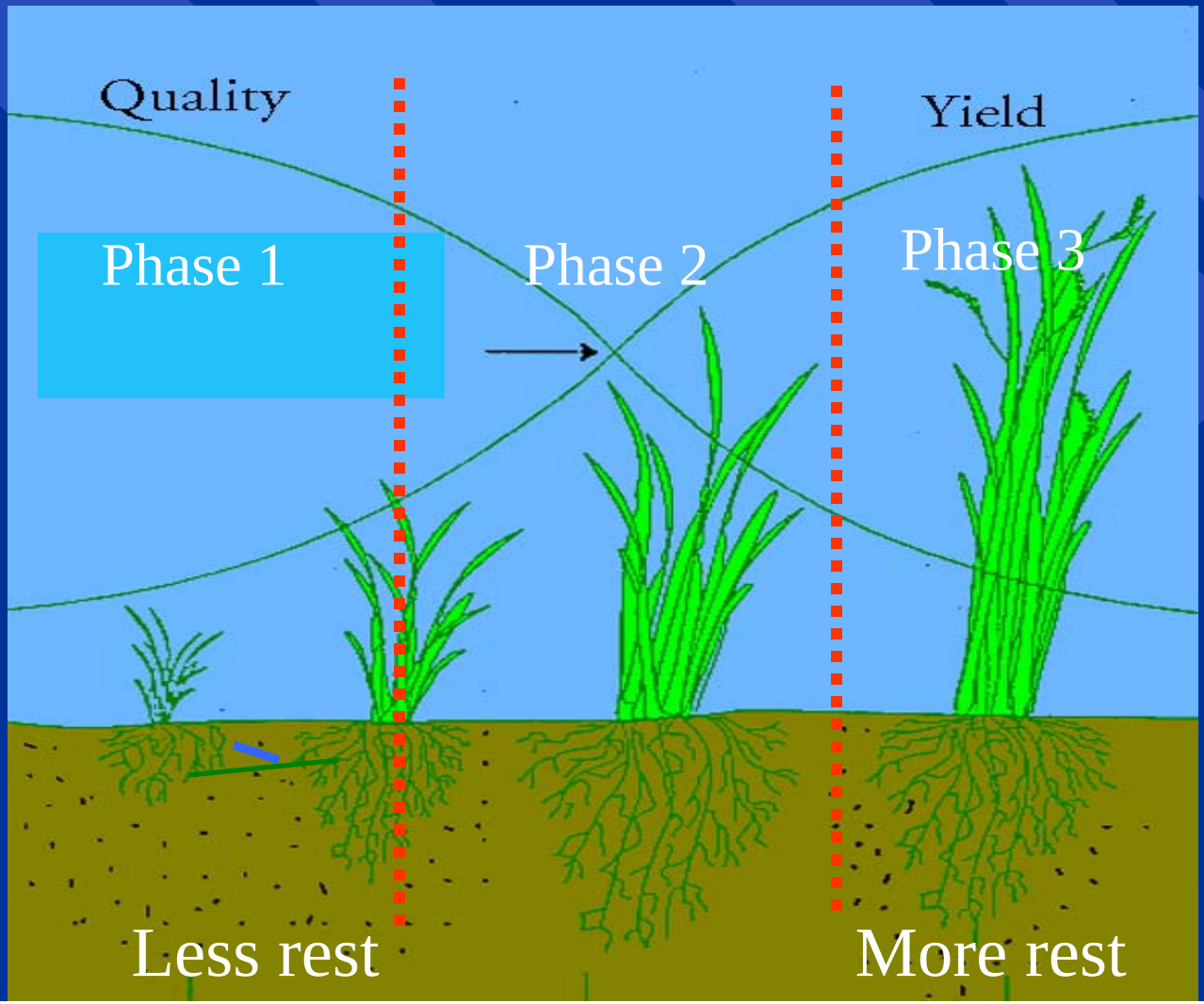
In Rotational Grazing…

- Pastures are subdivided into smaller areas (or paddocks)
- A portion of the pasture is grazed while the remainder "Rests"
- Paddocks are allowed to:
  - Renew energy reserves
  - Rebuild plant vigor
  - Improve long-term production

Monthly forage production in 2-acre grass and grass-legume pastures



The Yield - Quality Compromise



Time basis of the grazing period: Plant perspective

- Avoid the 'second' bite
  - Reduces leaf area available for photosynthesis
  - Affects overall plant vigor

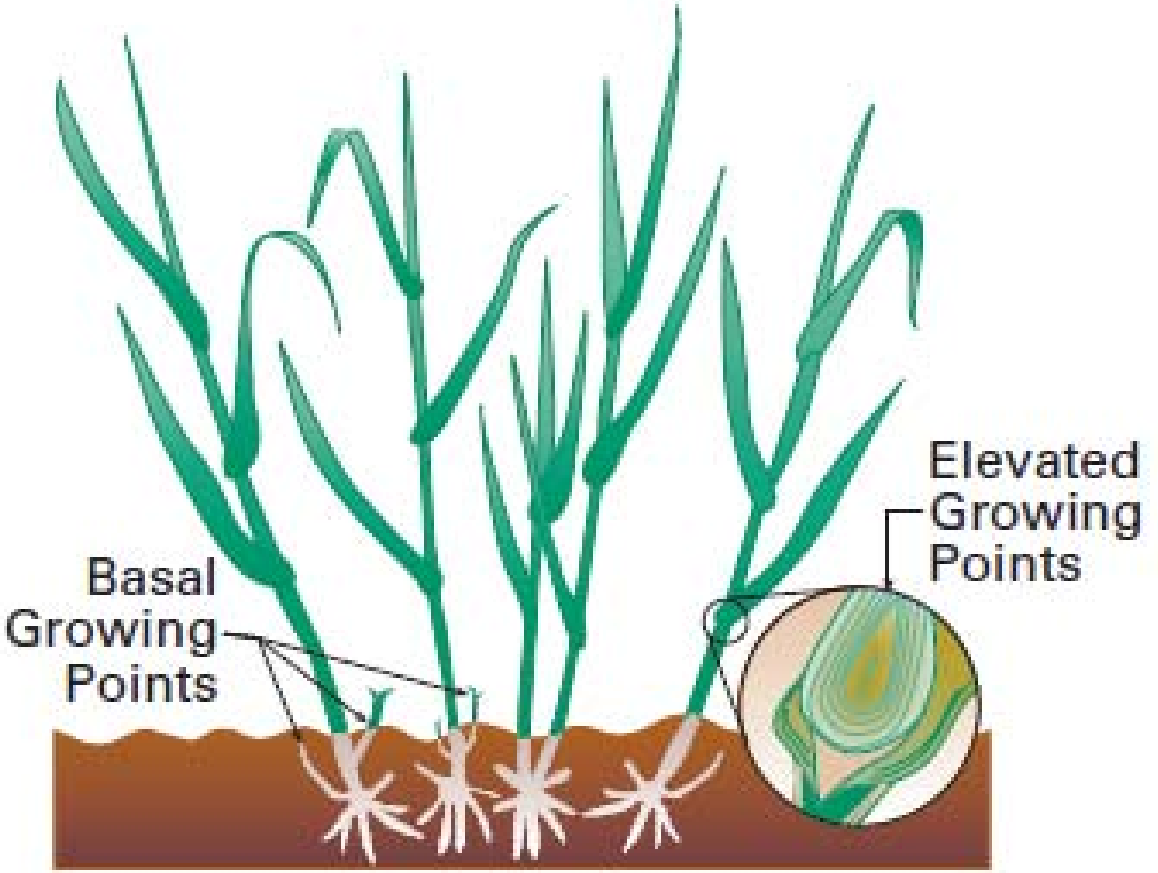
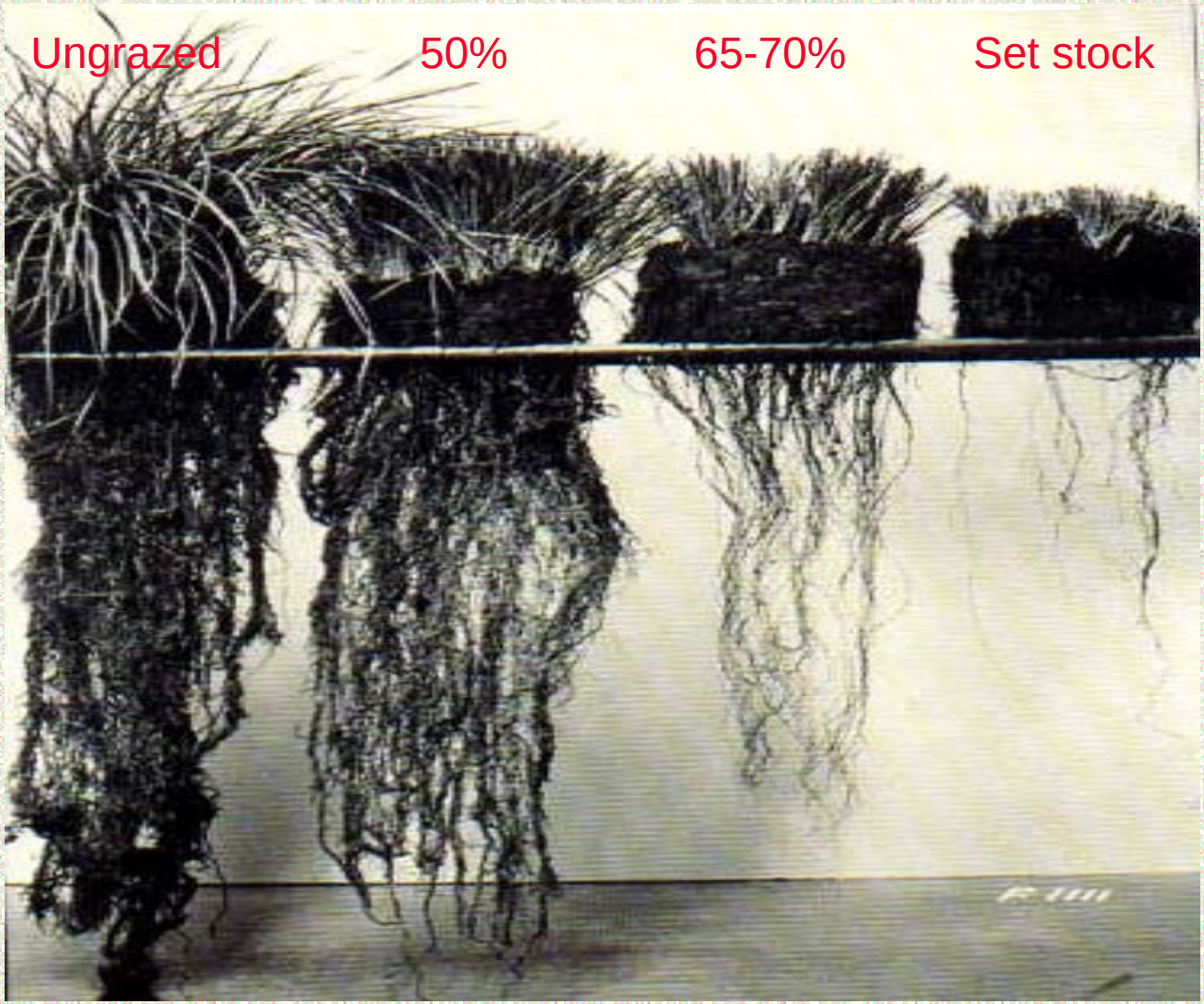


Figure 6. Elevated growing points are vulnerable to removal by grazing.

Plant Vigor-Leaves and Roots

Caring for the Green Zone, Riparian Areas and Grazing Management

Alberta Riparian Habitat Management Project, "Cows and Fish Project"



Grazing and root growth

- Repeatedly grazing the plant top short produces shortened root growth

Plant Vigor-Leaves and Roots

Caring for the Green Zone, Riparian Areas and Grazing Management

Alberta Riparian Habitat Management Project, "Cows and Fish Project"

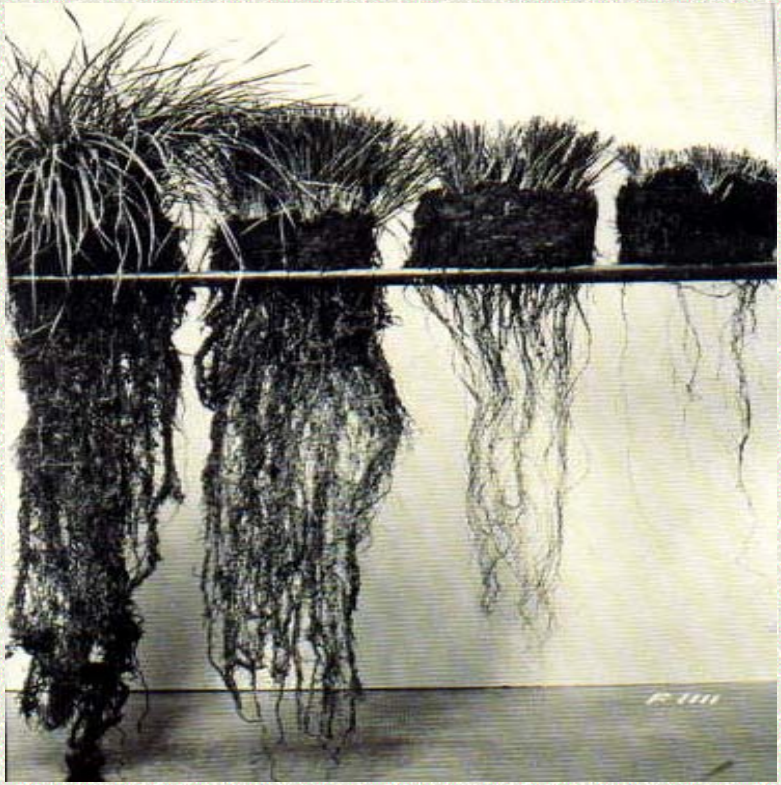
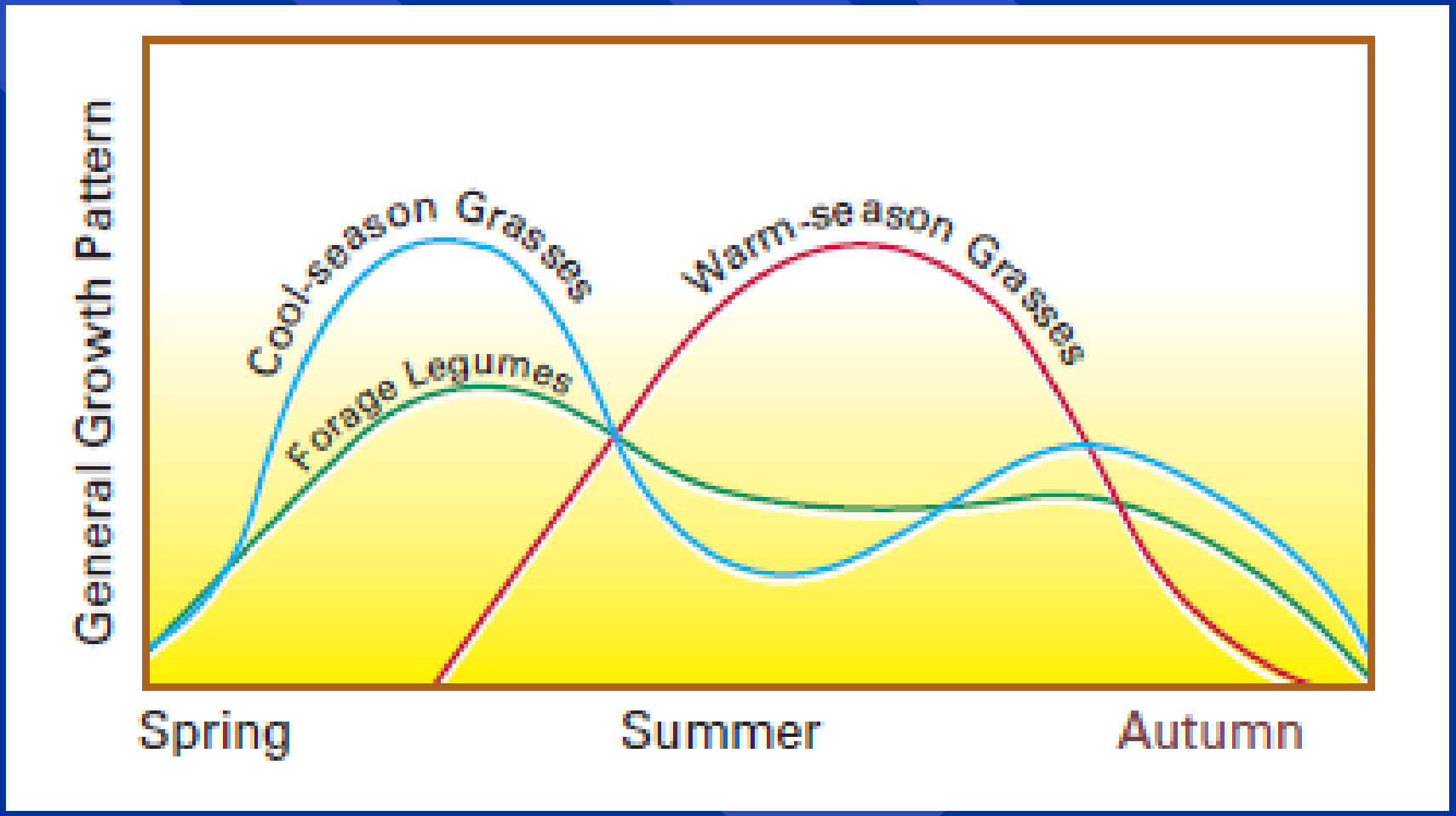


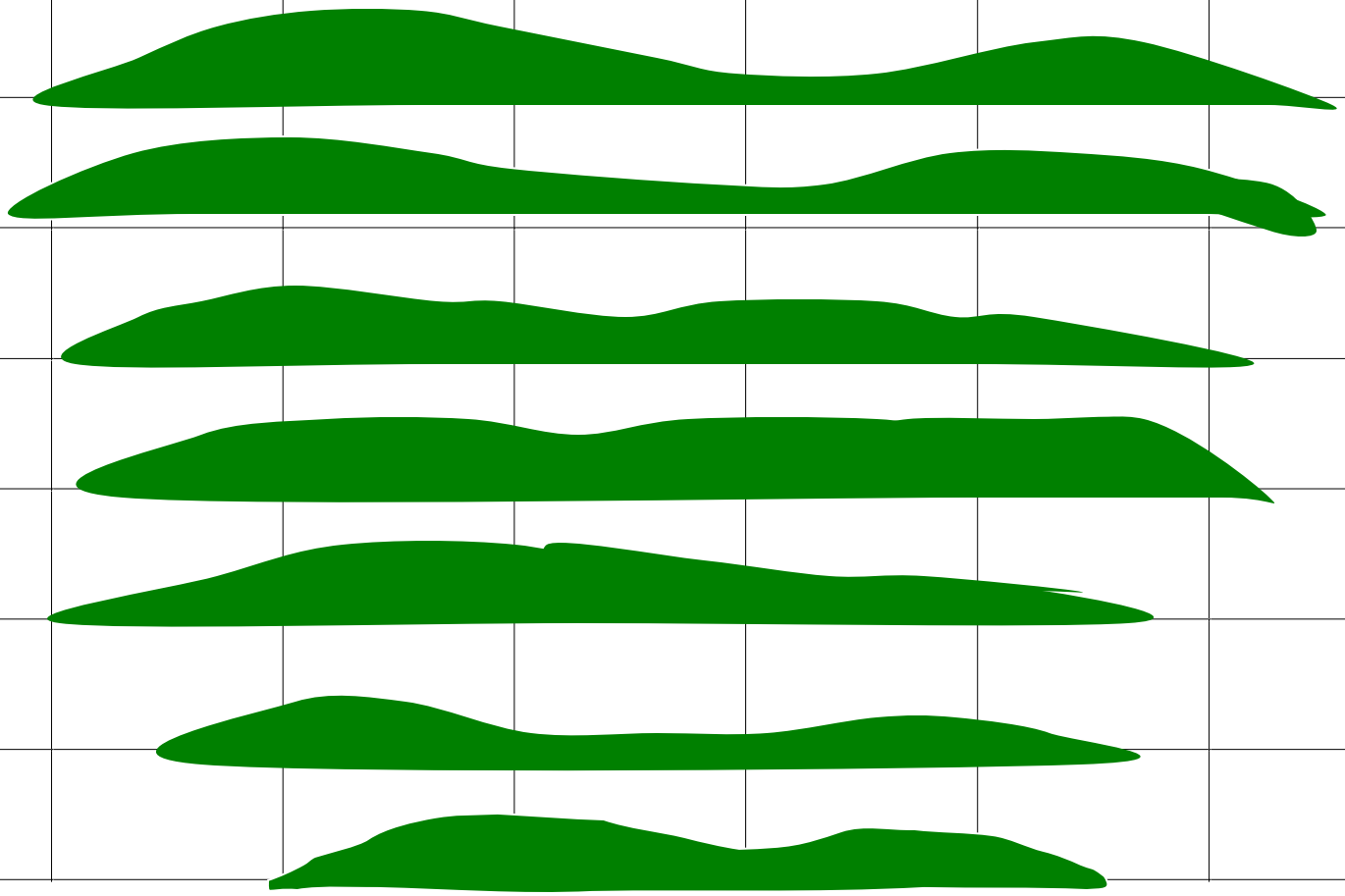
Figure 7. The more complete table of root growth stoppage

Percent leaf removal	Rhodes grass (single clipping)	Rhodes grass	Smooth bromegrass	Kentucky bluegrass
		(repeated clipping)		
0	0	0	0	0
20	0	0	0	0
30	0	0	0	0
40	0	0	0	0
50	2	8	13	38
60	50	80	36	54
70	78	97	76	77
80	100	100	81	91
90	100	100	100	100


General Growth Pattern
Cool-season Grasses
Warm-season Grasses
Forage Legumes
Spring
Summer
Autumn

Seasonal growth patterns in forages

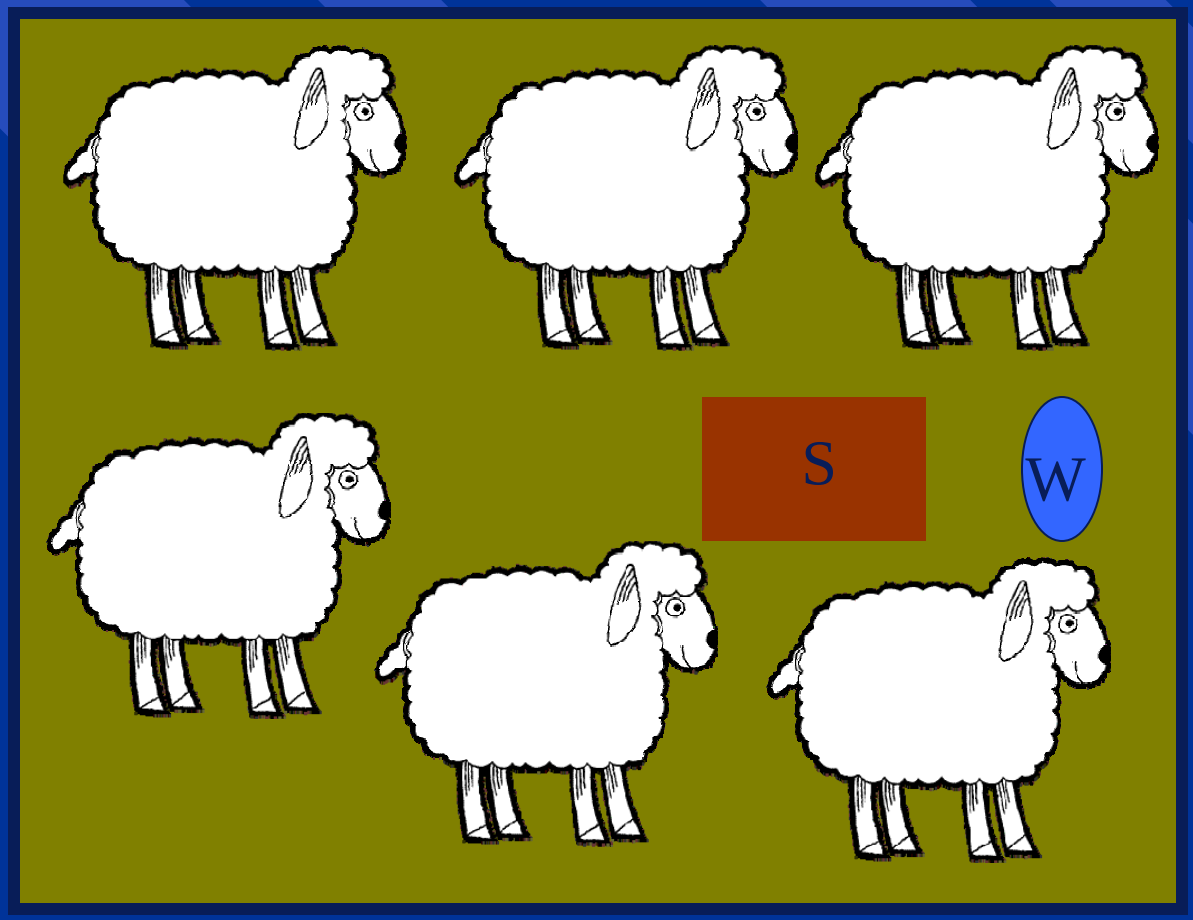
Species	April	May	June	July	Aug.	Sept.	Oct.
Kentucky bluegrass							
Orchardgrass							
Reed Conarygrass							
Alfalfa							
Red clover							
White clover							
Birdsfoot Trefoil							



Designing pasture systems

- Grazier's arithmetic
- http://www.umaine.edu/umext/pasture/Lessons/L5/intro5.htm
- Pasture "stick"/rising plate meter
- NRCS planning tool

Exercise Paddock



Intensive Rotational Grazing…

Involves a higher level of management

- Greater paddock numbers
- Shorter grazing periods
- Longer rest periods

Effect of paddock number on % of time resting

- Higher stock density allows for more rest time for every paddock

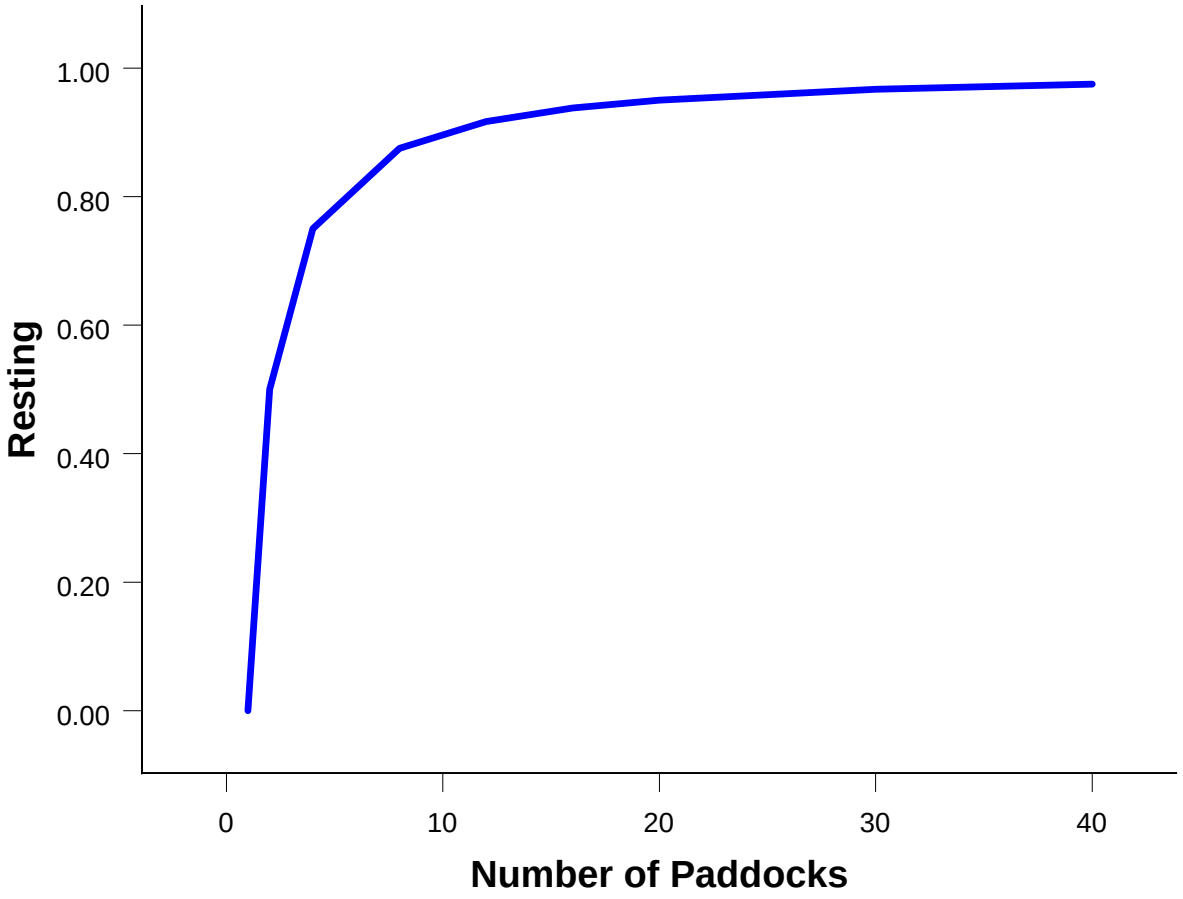
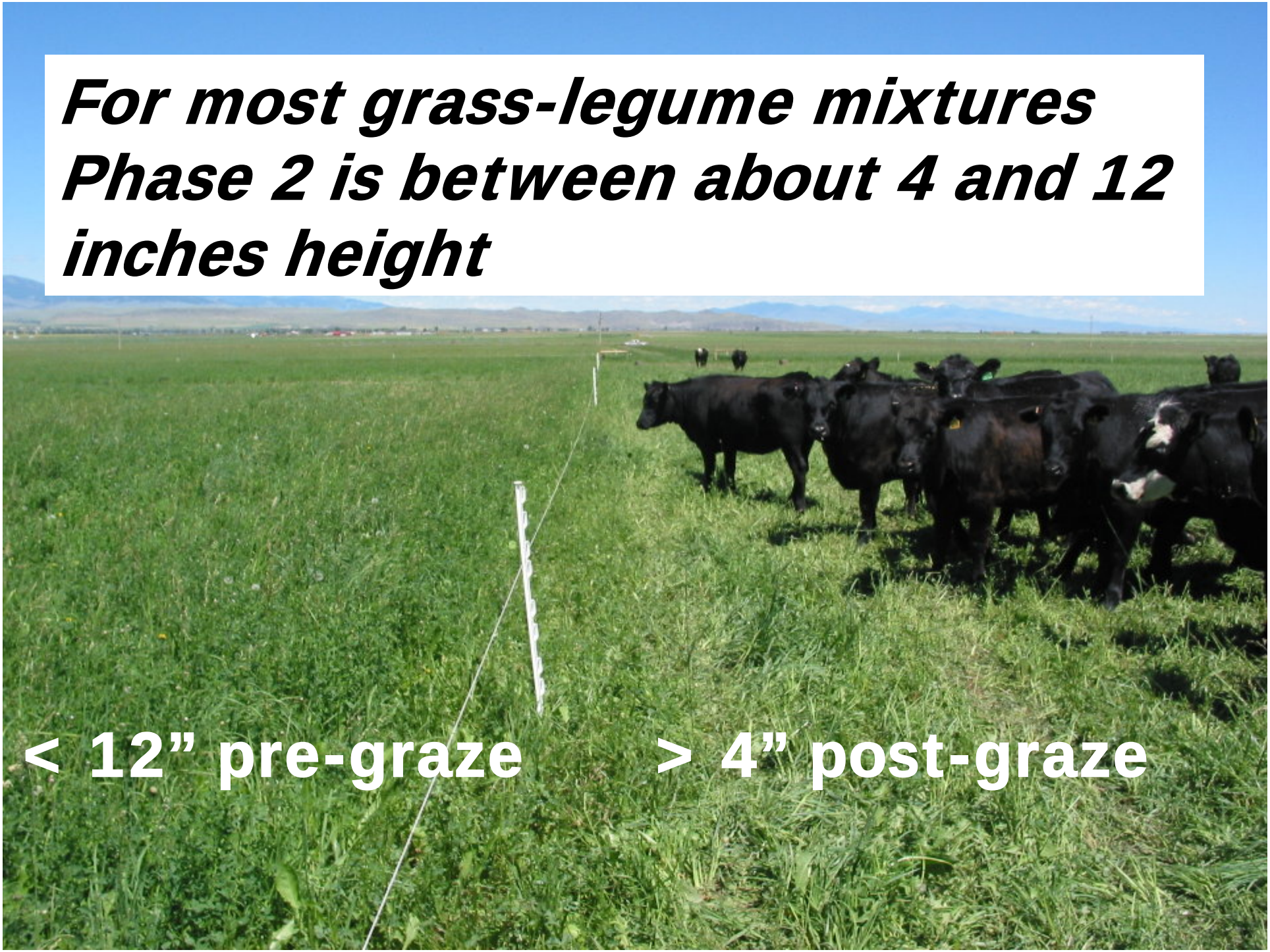


Table 1.1 Recommended pasture residency periods for livestock

Livestock Class	Number of Days in a Paddock	
	Spring	Summer
Lactating dairy cattle	0.5 – 2 days	0.5 – 2 days
Milking sheep or goats	1 – 2	3 - 4
Growing stock (steers, heifers, lambs)	2 – 4	6 - 8
Beef cow/calf, ewe/lamb	3 – 4	7 - 10
Most adult non-lactating stock	5 - 7	10 - 12

Adapted from Emmick and Fox (1993)

For most grass-legume mixtures Phase 2 is between about 4 and 12 inches height




Avoid grazing a pasture to Phase 1 !

Harvesting has a role in grazing system

Take first cutting and then graze in July and August

Time basis of the rest period: Animal perspective

- Too little rest reduces forage availability
- Intake restricted by small bite size

Manure Distribution: Continuous grazing

Grazing area

Ingestion

Loafing area

Excretion

Feces and urine

Plant available soil P

Grazing Management Tips

- Learn To Manage Your Pastures
- Avoid over or under grazing
- Apply fertilizer as needed (take a soil test)
- Re-seed pastures if necessary

Grazing Management Tips

- Commit Yourself Totally To Making It Work
- Make The Transition Gradually
- Solicit A Lot Of Advice, But Make Your Own Decisions
- Stay Flexible And Keep Investments Low
- Plan, Plan, & Re-plan

Well-managed pastures have some things in common

- Defined grazing period (*stay*—max days?)

-height entering (6-8 inches)

-height leaving (2-3 inches)

- Defined non-grazing period (*rest*)

-14 to 21 day minimum

- Uniform utilization of forage
- *Flexibility*

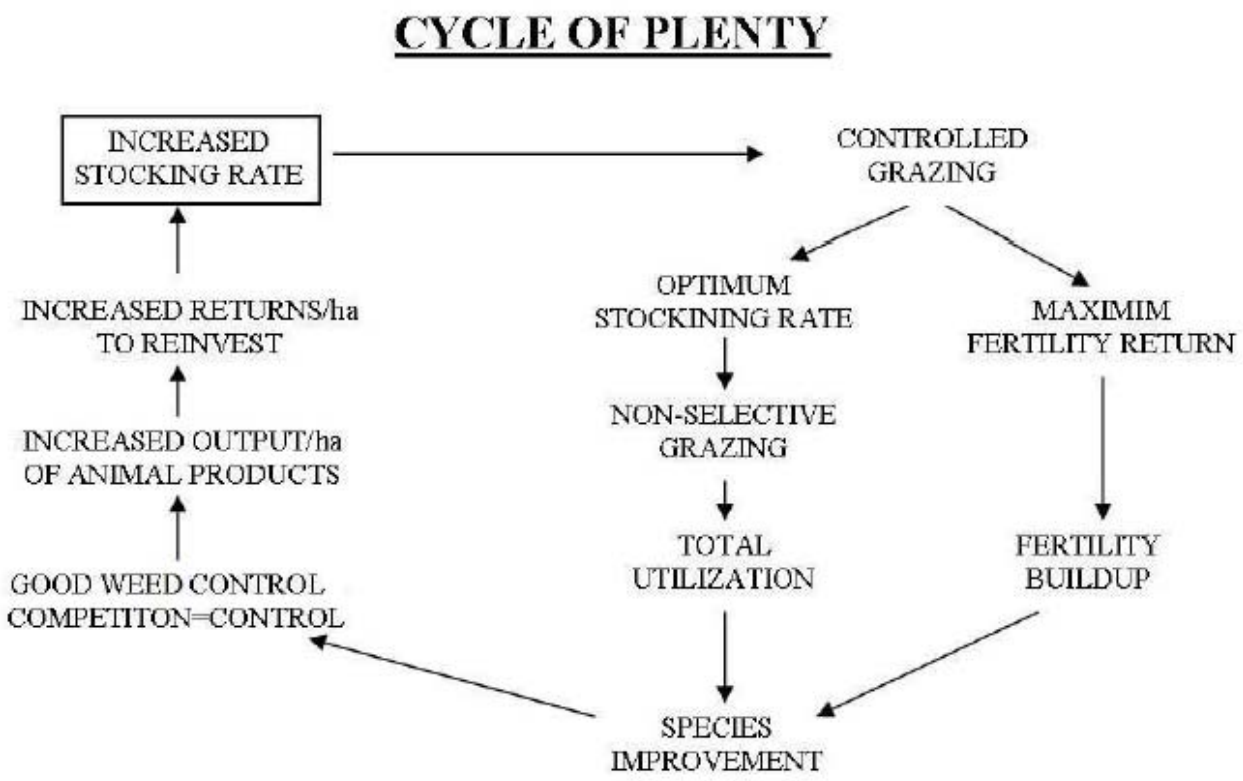


Figure 1.6 How controlled grazing contributes to the "Cycle of Plenty".

Adapted from Thomas and Goit 1986

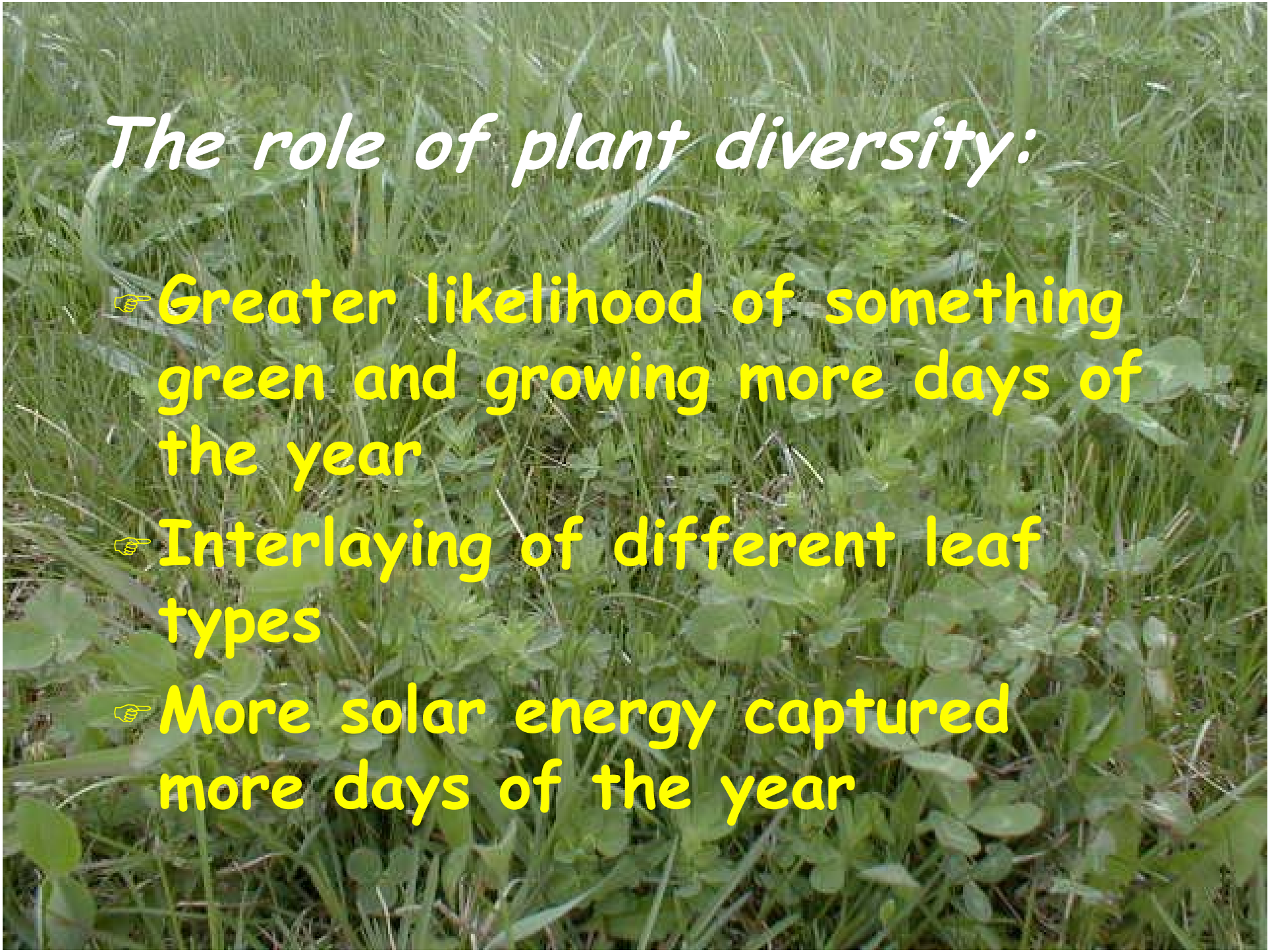
Pasture/Hayfield improvement

- Choosing desirable species
- Removing problem plants
- Seeding the correct times and methods

Choosing Forage Species

- Winterhardiness, soil drainage, pH and harvest management all influence choice of forage crops
- most legumes need good drainage, pH and fertility to consistently survive in Maine
- harvest (pasture, or hay) plays a big role in selection of crop

Species and Palatability



The role of plant diversity:

- Greater likelihood of something green and growing more days of the year
- Interlaying of different leaf types
- More solar energy captured more days of the year

Table 5. How Forages Respond to Harvest Management

	Conserved Forage	Rotational Grazing	Continuous Grazing
Alfalfa	●	⌀	▽
Clover - Red	●	○	⌀
- White	○	●	⌀
- Ladino	○	●	⌀
- Alsike	●	●	⌀
Birdsfoot Trefoil	●	●	⌀
Timothy	●	○	▽
Bromegrass	●	○	⌀
Orchardgrass	●	●	○
Reed Canary	●	●	○
Fescue - Tall	●	●	○
- Meadow	○	●	●
Perennial Ryegrass	●	●	○
Redtop	⌀	●	●
Bluegrass	⌀	●	●

● Highly suitable
○ Suitable
⌀ Not recommended but crop will tolerate
▽ Crop damage

From **Field Crop Guide for the Atlantic Provinces**, 1985-1990.

Other Seeding methods..

- Frost seeding
- Animal Seeding
- Rotational crops
- "extended season"


Hoof-n-tooth reseeding

Timing of seeding

- Seeding needs to be done when conditions favor the growth of the desirable species and limit the growth of annual weeds
- Early Spring or late summer are "usually" dependable times

Resources

- "This old Hayfield"
- Selecting forage crops for your farm
- Forage Quality in Perspective
- Growing Forage Legumes
- Growing Forage Grasses
- Frost Seeding