

# Pasture/Hay Management

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UNIVERSITY OF MISSOURI  
 Extension

- **Manage for Persistence, Quality, Yield**
  - **Soil sampling**
  - **Species selection & establishment**
  - **Nutrient management**
  - **Controlling competition**
- **Grazing management**

# **Know Where You Stand**

## **Soil Testing Pays**

- **Soil pH – limiting factor**
  - **Critical for persistence, quality, and yield**
- **Avoid potential nutrient deficiencies**
- **Reveal possible causes for poor production**
- **Apply enough plant nutrients**
  - **Avoid excessive expense**
- **Decide if you are going to follow guidelines!**
  - **Soil test recommendations are not directly tied to your economic situation**

# Obtaining a quality soil sample

- **Sample every 3 to 4 years**
- **In a 20-acre field, there are 40 million pounds of soil. You send 1 pound to the lab.**
- **Bad Sample = Bad Decisions**







# Obtaining a quality soil sample

- Sample 6-8 inches deep in the soil
  - Take a uniform quantity of soil from each subsample
  - If using a shovel dig a hole and slice off one side
- After collecting 10-20 cores in a bucket - crumble the soil into small pieces and mix well.
- Remove rocks, grass and sticks.
- Place about a pint of soil in a soil sample box or zip-lock bag. Discard excess soil.
- Label the box for future identification.



# Caution

- **Avoid sampling soon after applying fertilizer, lime or manure.**
  - **Best to wait 1 year; at least 4-6 months**
- **Avoid sampling areas around watering points, shade trees, gravel roads and other known hot spots. Avoid old manure piles.**



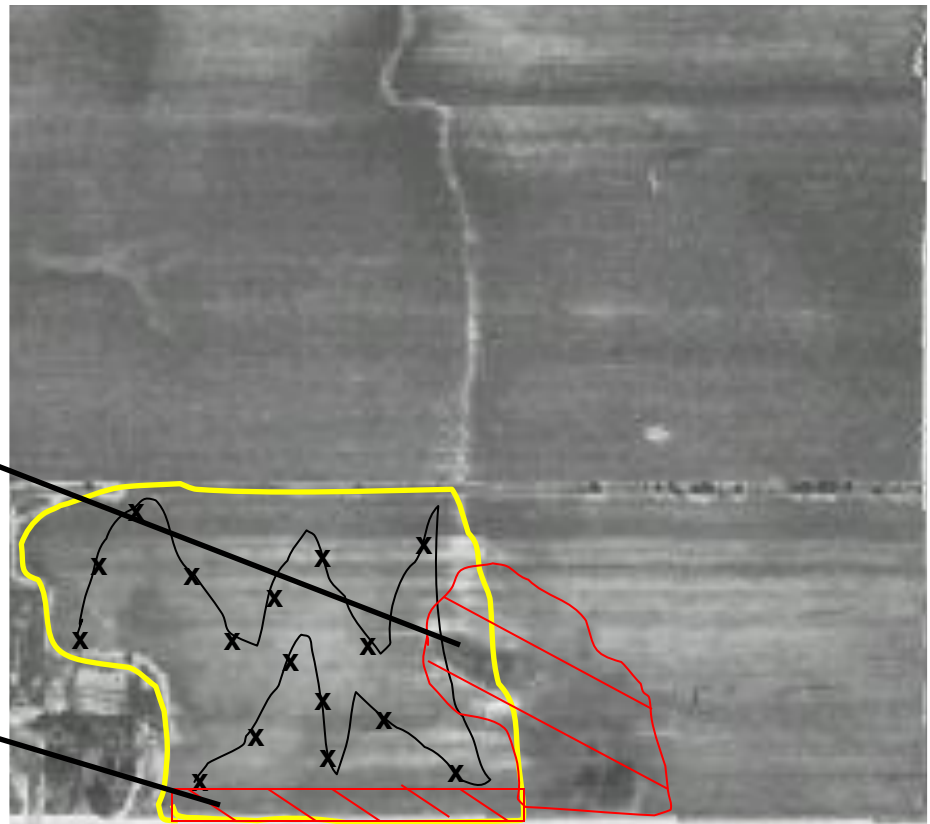
# Sampling Timing

- Samples taken monthly in same spot 3 years in a row
  - Univ. of Illinois
- Potassium Levels
  - highest March – June
  - lowest August – September
  - Varied from 310 – 140 lbs/acre
- Potassium generally tests lower in dry conditions.

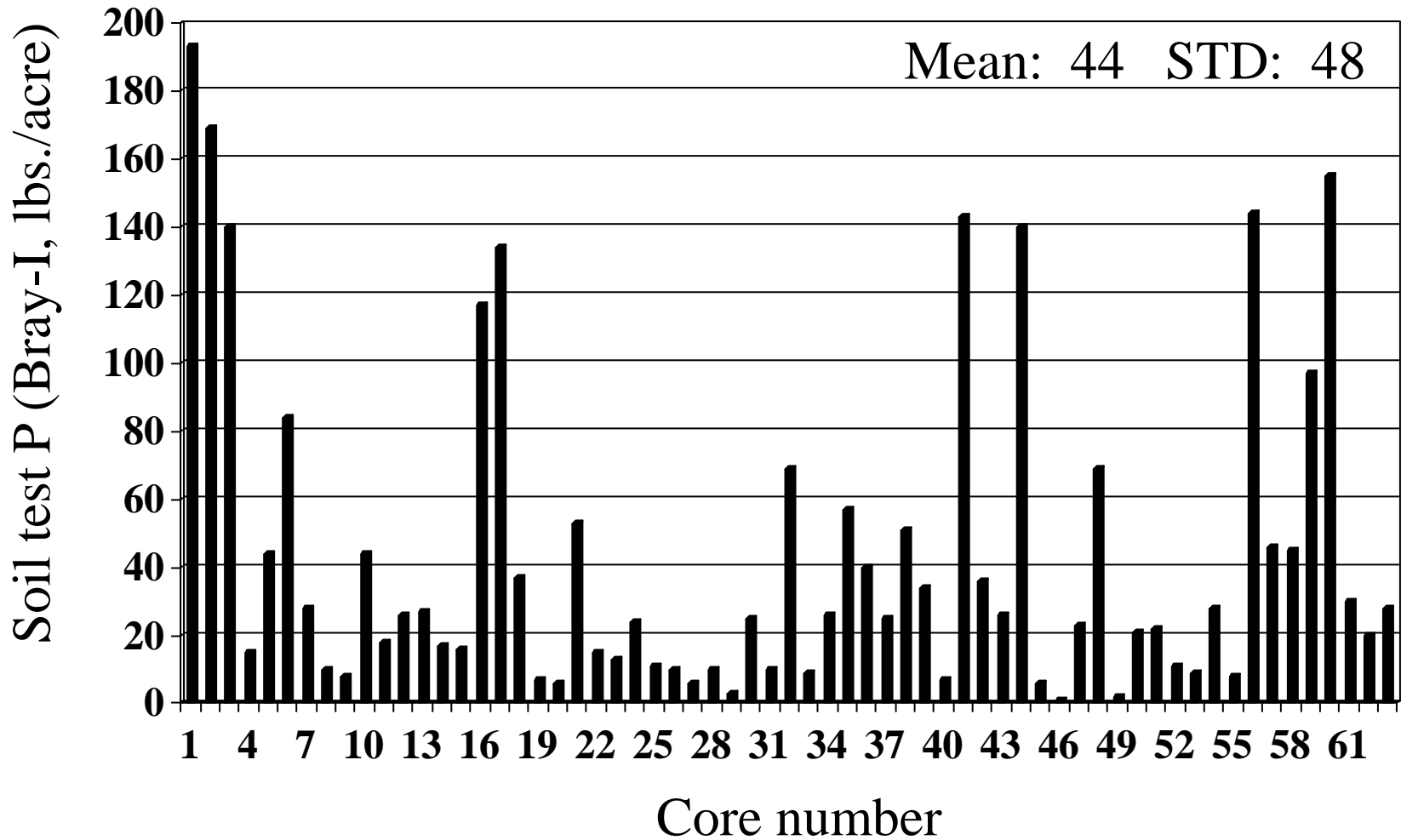


# Obtaining a good soil sample

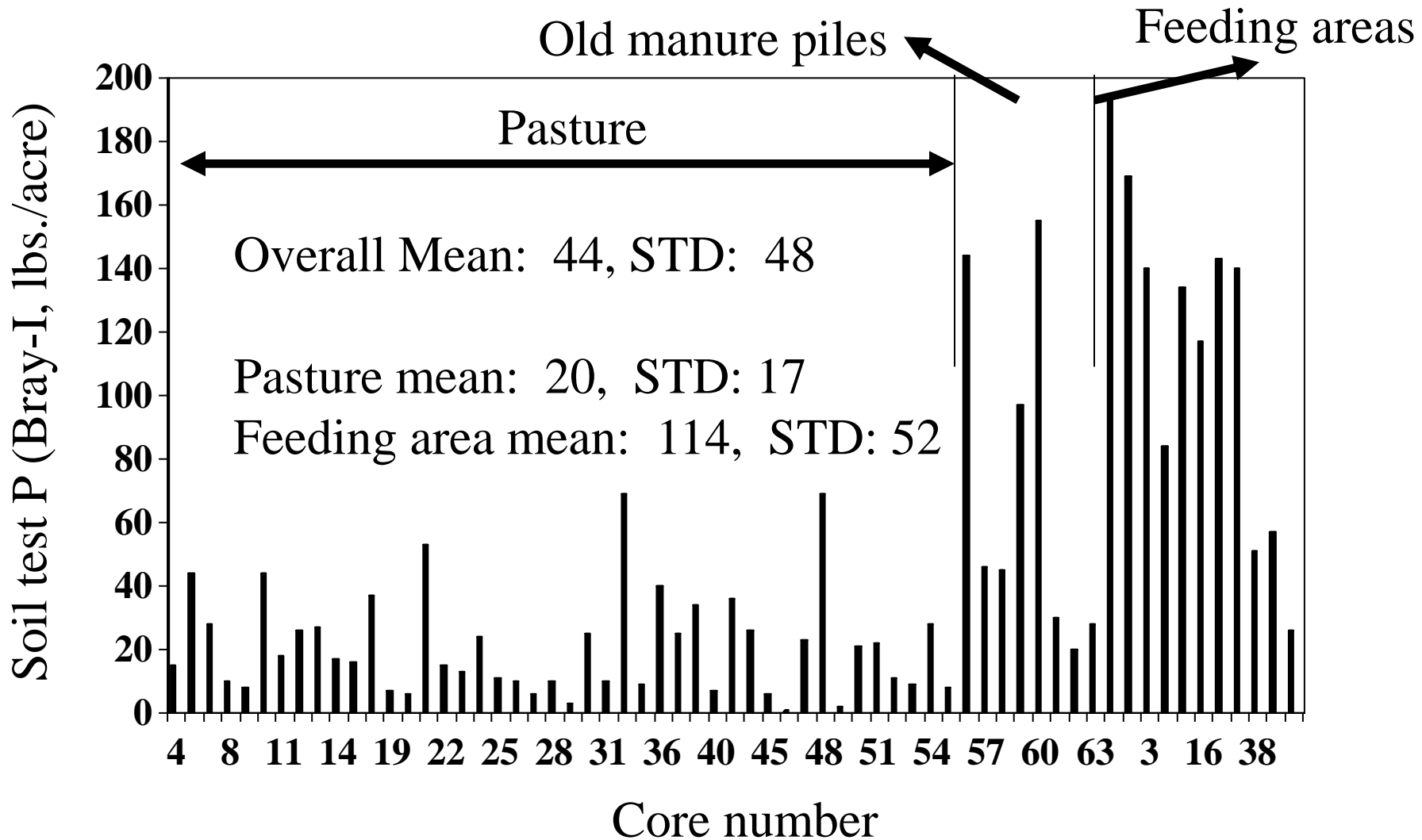
- Avoid sampling near feeding areas and shade trees in pasture
- Avoid sampling near road



# Soil test data from one core is highly variable



# Accuracy can be increased by dividing fields based on known variability



# Interpreting Soil Test Results

- **Low**
  - Yield loss likely.
  - Forage quality is reduced.
- **Medium**
  - Yield loss possible.
  - Improved persistence.
- **High**
  - Benefits from fertilization unlikely.

# **All Soil Test Recommendations for P & K Include:**

- **Critical Level**
  - Yield loss below this level
  - 30 – 40 lb P & 160+5(CEC) lb K
- **Crop removal**
  - How much goes out with the crop
- **Build-up**
  - Extra added to keep soil testing above target level.

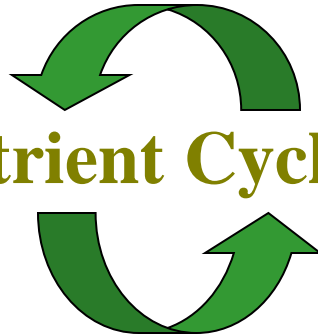
# Nutrient Cycle: Hay System



## Inputs

- fertilizer
- manure
- legumes (N)

## Nutrient Cycle



## Exports

- remove 80% of nutrients in hay

3 tons of hay remove:

- 120 lb. nitrogen
- 27 lb.  $P_2O_5$
- 102 lb.  $K_2O$



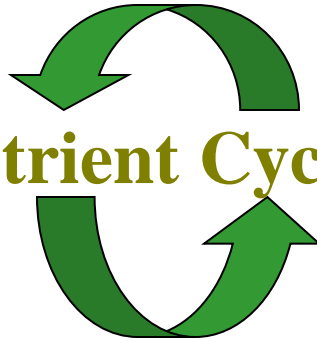


# Nutrient Cycle: Pasture System

## Inputs

- fertilizer
- manure
- legumes (N)
- feed

## Nutrient Cycle



## Exports

- calves
- beef

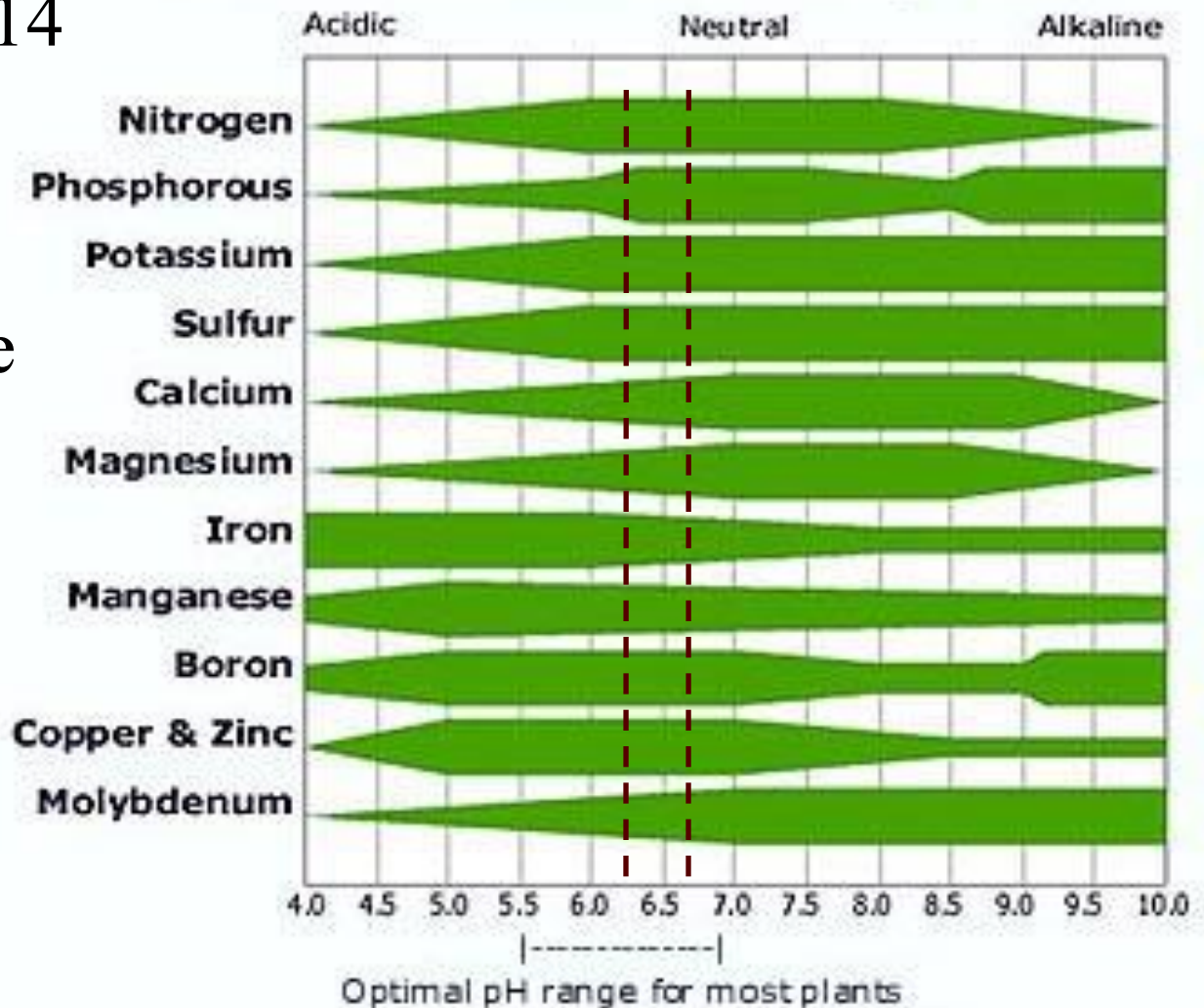
Cow/calf pair, stocker removal rates

- 10 lb. nitrogen
- 7 lb.  $P_2O_5$
- 1 lb.  $K_2O$



# Soil pH

**Plant Nutrient Availability Chart**



- pH scale = 0 to 14  
0=Strong Acid  
7= Neutral  
14= Strong Base
- For best plant growth and nutrient availability:  
pH= 6.2 to 6.5

# Low pH<sub>s</sub> (below 5.5)

- **Increased aluminum solubility**
  - stunted root growth
  - reduced nutrient uptake
- **Reduced nutrient availability**
  - phosphorus
- **Poor legume growth**
  - survival and activity of N fixing bacteria reduced
  - reduced success of the symbiosis

# Lime Provides the Basis for Fertility

- **Lime is the most economical amendment to apply**
- **Limestone (Calcium Carbonate)**
- **ENM (Effective Neutralizable Material) rates limestone's effectiveness**
- **Smaller the particle size, the faster the action (higher ENM)**
- **No more than 2-3 tons per acre per year**
- **Sources: Ag Lime (~400-700 ENM); Dolomitic Lime (Mg source)**



# Limestone Puts Nutrients to Work

## Percent Nutrient Availability

pH (salt)	Nitrogen %	Phosphorus %	Potassium %
4.0	30	23	33
4.5	53	34	52
5.0	77	48	77
5.5	89	52	100
6.5	100	100	100

# **Types of Forages**

**annual & perennial**

**cool-season & warm-season**

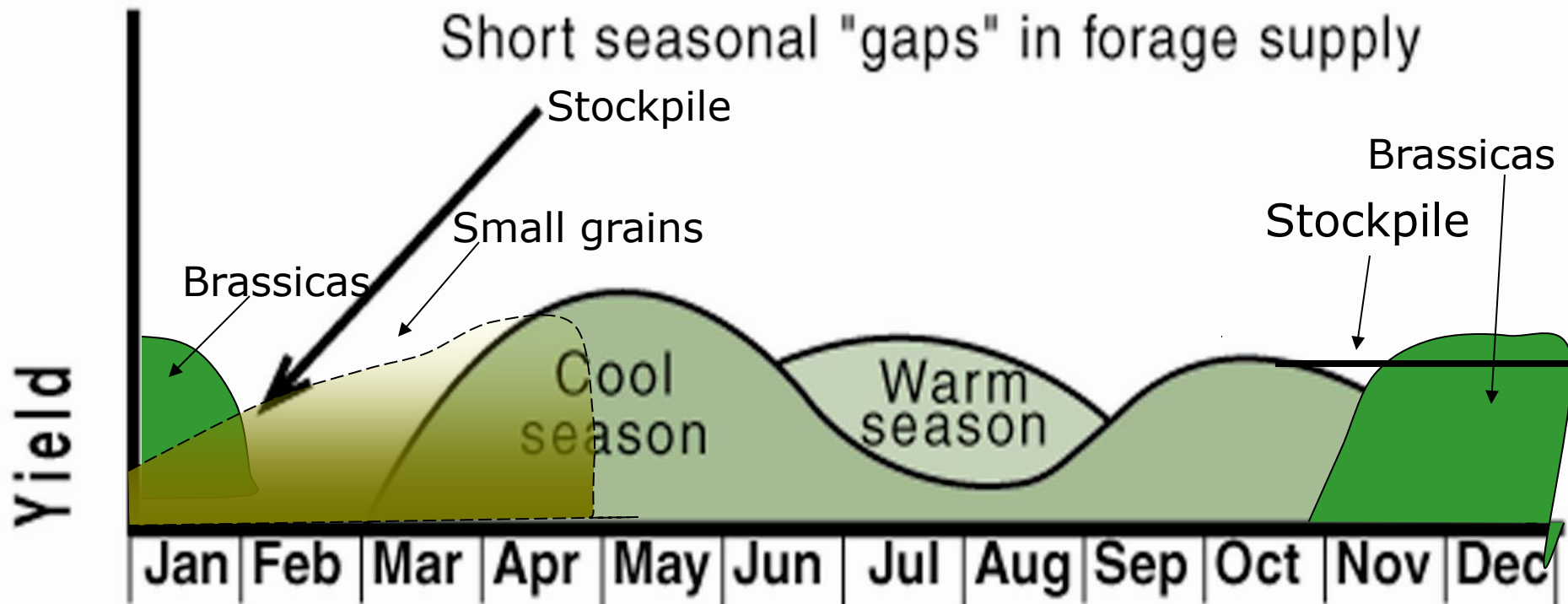
**grasses & legumes**

**forbs & browse**

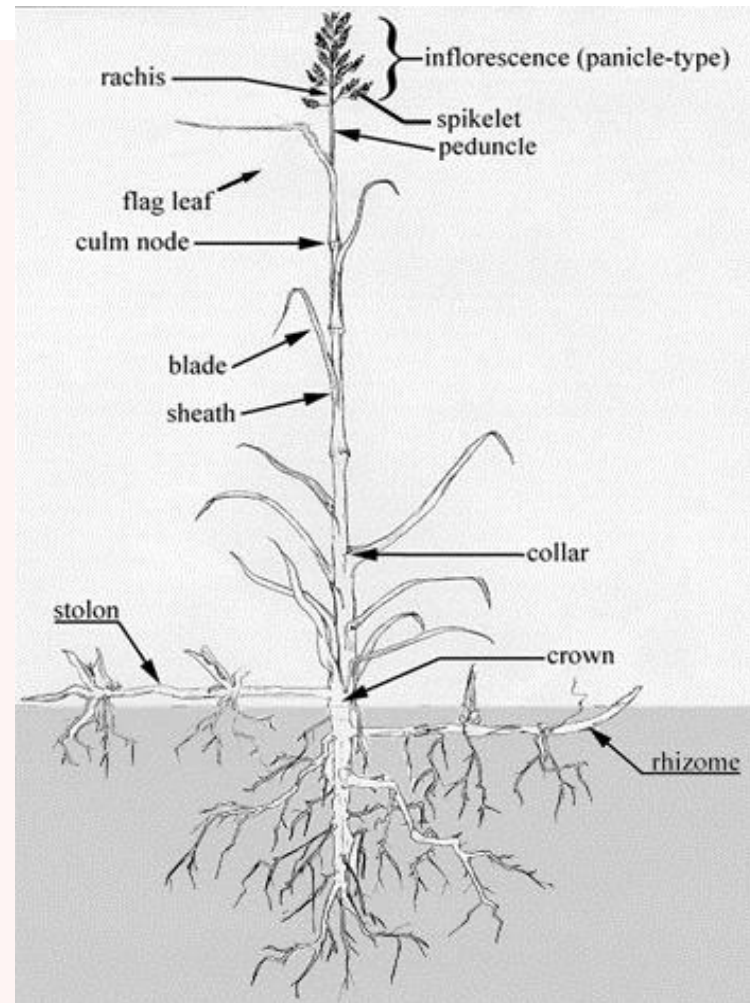
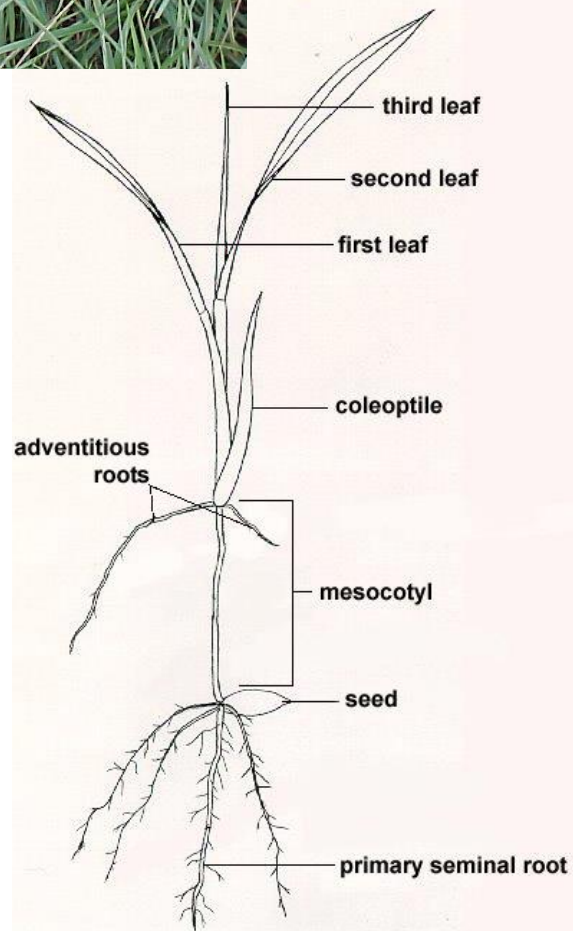
# **Plant Selection**

- **Cattle and Sheep**
  - **Grass + Legumes + Forbs (optional)**
- **Horse**
  - **Grass w/ Limited Legume**
- **Goats**
  - **Browse + Forbs + Grass**

# Balanced Forage System

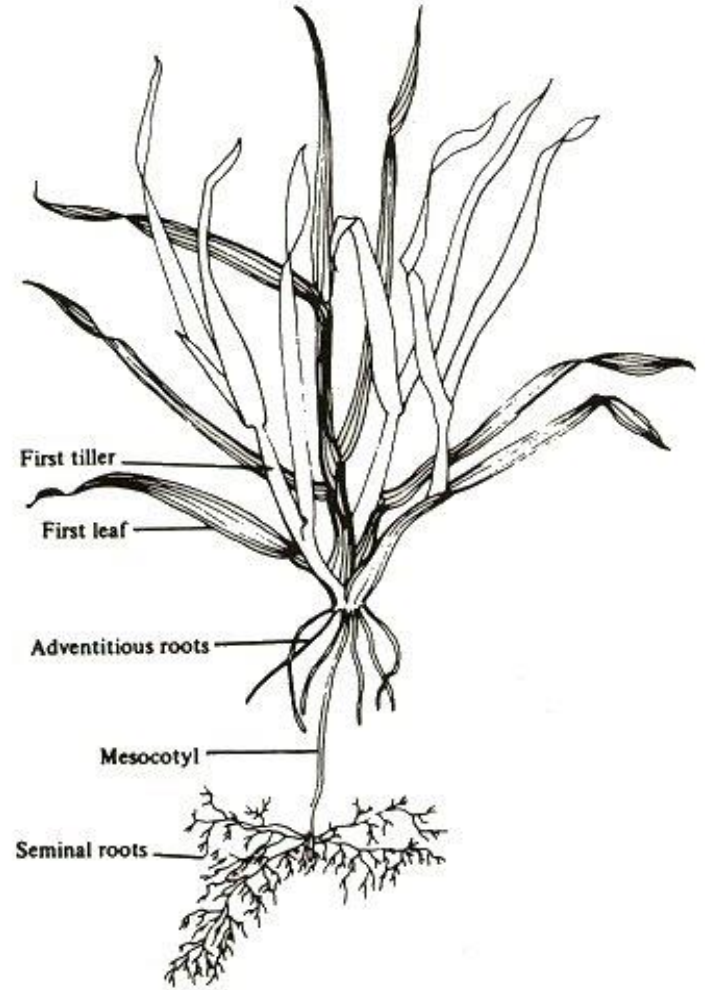


# Establishing





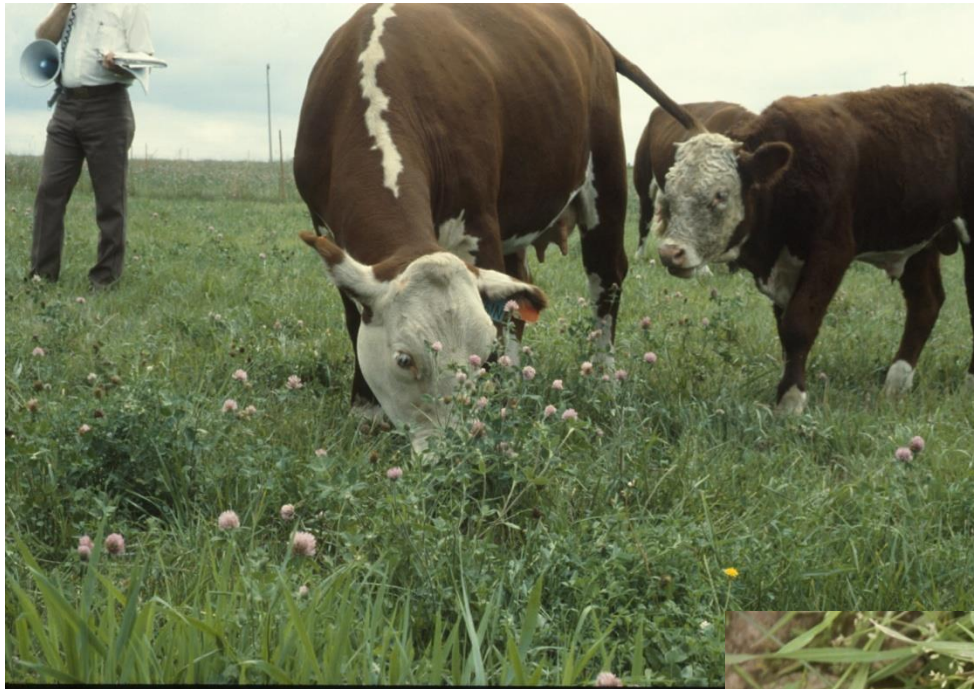
# Grass Tillers



Initially, tillers depend on carbohydrates developed the previous fall. Then as leaf area explodes with additional tillers, new sugars are made

# Establishing

- **Legumes**
  - **Legumes are broadleaf plants that fix atmospheric nitrogen through symbiotic relationship with rhizobia (nodule bacteria)**
  - **Inoculate legumes (lespedeza could be exception)**
    - **Inoculant specific to legume species**



# Grow Your Own Nitrogen

**Legumes can fix 50-300 lbs N/Ac. Legumes transfer up to 20% of their fixed N to surrounding grass. Most N comes through manure and urine.**



# Establishing

- **Forbs**

- Forbs are broadleaf plants that are not legumes
  - **Brassicas – Forage rape, Kale, Swedes, Turnips**
    - <http://ohioline.osu.edu/agf-fact/0020.html>
    - <http://msucares.com/crops/forages/newsletters/09/9.pdf>
    - Planted in mid-April for summer or early August for fall grazing (75 days/75%)
  - **Weeds – Dock, Plantain, Dandelion, Chicory, Ragweed, Pigweed, Lambsquarter**
    - Some weeds can be poisonous and are often avoided if paddocks are properly grazed

# Weeds



# Brassicas



# Establishing

- **Browse**

- **Browse are broadleaf woody plants**

- **Trees, Brambles, Shrubs, Vines**

- **There are some browse plants that are poisonous**

- **Numerous plants can cause problems; however, internet lists can be inaccurate either direction**

# Tall Fescue

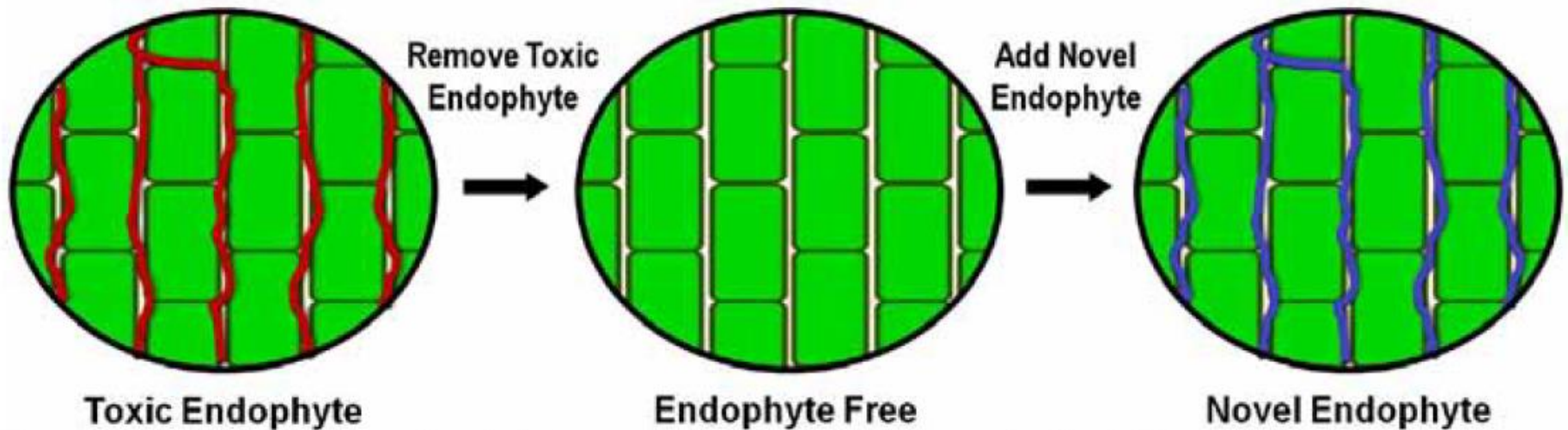
- **Hardiness and adaptable for many utilities**
- **Forage quality highest in spring and fall**
- **Waxy leaf = retains quality into winter**
  - **Stockpiling for deferred winter grazing**
- **Grazing height**
  - **6 to 8” start; 3” stop**



# Tall Fescue

- **Endophyte fescue**
  - **Fungus found in stem, leaf sheaths & seed**
  - **Produces alkaloids toxic to livestock**
  - **Increases progressively season long**
  - **Minimized in young growth**
- **Endophyte-free fescue**
- **Novel “friendly-endophyte” fescue**





**Figure 1.** Hyphae of the fungal endophyte grow between the cells (green) of the tall fescue plant. When building a novel endophyte-infected tall fescue, the toxic endophyte (red lines) is removed from the tall fescue plant to create an endophyte-free plant. Then, the novel endophyte (blue lines) is introduced into the plant.

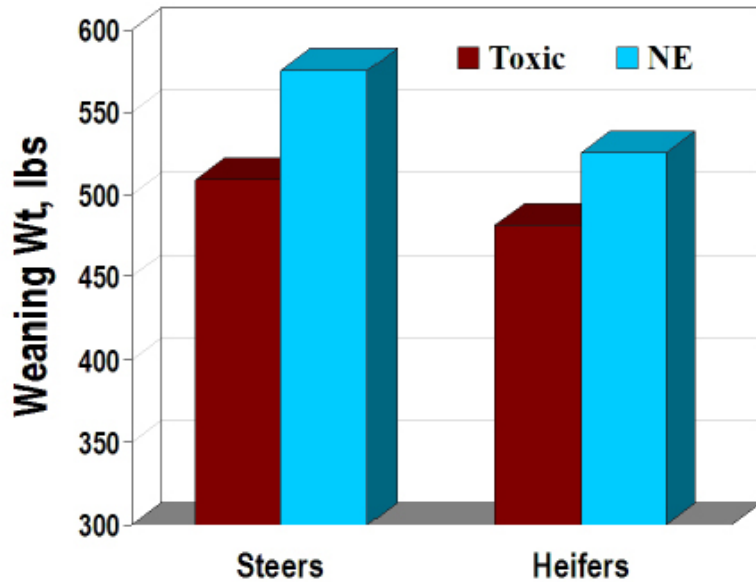
# **Novel Endophyte Fescue**

- **The problem with “endophyte-free”**
  - **Reduced persistence, vigor and drought tolerance**
- **Some of the Available Novel Varieties:**
  - **MaxQ – Pennington**
  - **BarOptima Plus – Barenbrug**
  - **Estancia – Mountain View**
  - **Protek – DLF**









**Figure 3.** Calf weaning weights of cattle grazing toxic or novel endophyte (NE; “Jesup MaxQ™”) tall fescue stands. Values are averages of two years' data collected near Calhoun, Ga. (Bouton et al., 2000, and Watson et al., 2001).

**Table 1.** Cow-calf performance on toxic or novel endophyte (NE) tall fescue stands.<sup>†</sup>

	Toxic	NE
<b>Cow Performance</b>		
Wt. at end of breeding, lbs.	1110	1236
Wt. at end of weaning, lbs.	1005	1122
BCS at end of breeding <sup>‡</sup>	5.4	5.7
Pregnancy Rate, %	44.7	85.1
<b>Calf Performance</b>		
Actual Weaning Wt., lbs.	461	529
Adj. (205 d) Weaning Wt., lbs.	436	504
ADG (birth to wean), lbs. <sup>§</sup>	1.7	2.1
<b>Replacement Heifers</b>		
Actual Weaning Wt., lbs.	459	498
Calving Rate, %	64.1	90.6

<sup>†</sup> Adapted from University of Arkansas Experiment Station Reports by Coffey et al. (2007 and 2008).

<sup>‡</sup> BCS: Body Condition Score.

<sup>§</sup> ADG: Average Daily Gain.



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## Participants

### Agribusiness



### University of Missouri



### Nonprofits



[Missouri Forage & Grassland Council/Grazing Lands Conservation Initiative](#)



### Government



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RENEWAL

This seed lot has been tested and determined to contain at least 70% novel (selected) endophyte and no more than 5% off-type endophyte.  
[www.grasslandrenewal.org](http://www.grasslandrenewal.org)

# Forage Species

- **Annual Cool Season Grasses**
  - **Annual Ryegrass**
  - **Small Grains**
    - **Wheat**
    - **Cereal Rye**
    - **Oats (winter kill)**



# Annual Ryegrass

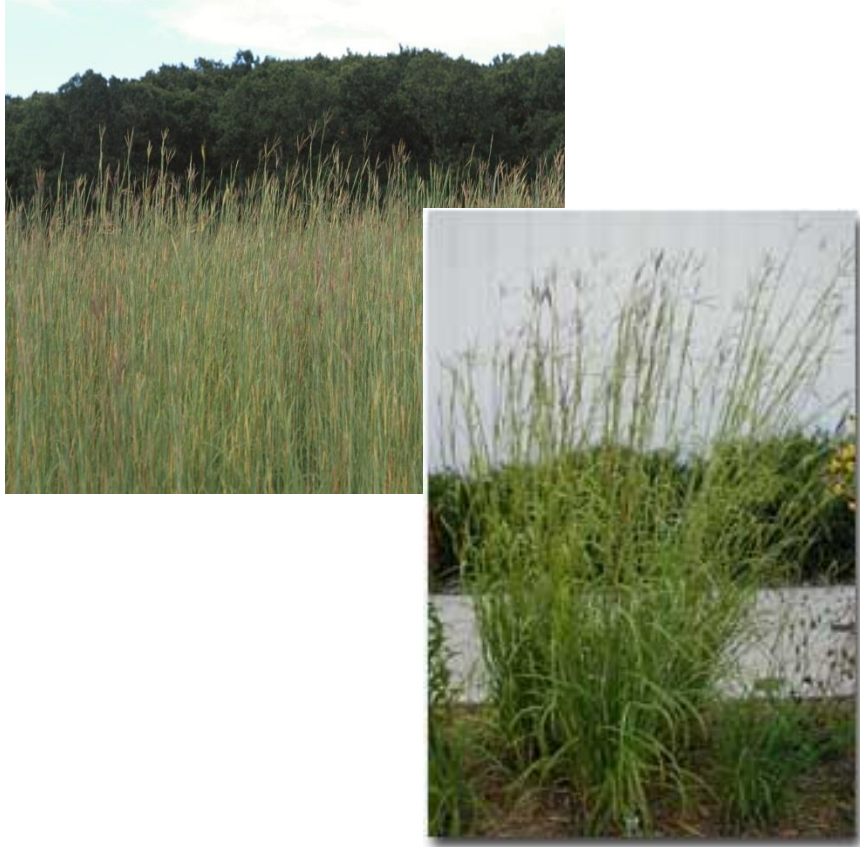


- **A good fit for thin fescue**
- **Rapid fall growth**
- **Retains green tissue nearly all winter**
- **Remains vegetative through May**
- **Reproduces by seed**
- **Remove cows mid-May**

# Forage Species

- **Perennial Warm Season Grasses**
  - **Native**
    - **Big bluestem**
    - **Switchgrass**
    - **Indiangrass**
  - **Introduced**
    - **Bermuda**
    - **Old World Bluestems**

# Big Bluestem



- **Drought tolerant**
- **Slow to establish**
- **Good production timing for our area**
- **Good quality if managed to avoid maturity**
- **Grazing**
  - **12” start; 6” stop**
  - **Early September stop**

Varieties: Bonanza; Goldmine;  
Rountree; Kaw; Oz 70

# Indiangrass

- **A late producer: 2 weeks later than big bluestem**
- **Lower yielding than big bluestem**
- **Not always persistent**
- **More suited for hay**
- **Grazing –**
  - 12” start; 6” stop
  - Early September stop



# Forage Species

- **Annual Warm Season Grasses**
  - **Crabgrass**
  - **Pearl Millet**
  - **Sorghum-Sudan**

# **Pearlmillet & Sorghum-Sudan**

- **Good Quality – High Yield**
- **Pearlmillet = No prussic acid**
- **Split nitrogen**
- **Nitrate toxicity possible in both**
- **Annual seeding required**
- **Grazing**
  - **Pearlmillet – 18 to 30” start; 8” stop**
  - **Sorghum-sudan – 24 to 30” start; 8” stop**

# Forage Species

- **Legumes**
  - **Clover**
  - **Annual Lespedeza**
  - **Alfalfa**

# Where to Go From Here – Phase 1

## Starting from a straight K31 fescue base

- **No-till clover (Sept 1) or frost seed clover (Dec-Feb)**
- **Frost-seed lespedeza (Feb-Mar)**
- **No-till annual ryegrass into stand (Sept 1)**
- **Kill or retard old stand – No-till mix of fescue and annual ryegrass or orchardgrass (Sept 1)**
  - **Frost seed clover and/or lespedeza into new grass stand (Dec – Feb)**
- **Convert entire farm to novel fescues – Spray-smother-spray approach is imperative!**



# Where to Go From Here – Phase 2

Developing the warm season grass grazing platform  
10-25% of the grazing system

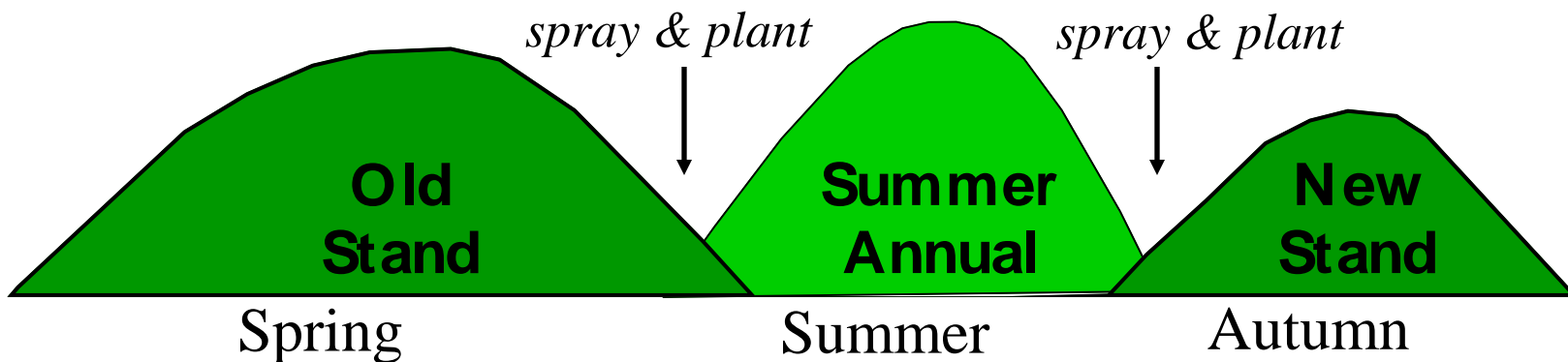
- **Warm Season Annual – Cool Season Annual**
  - If willing to manage a rotational system of annuals
- **Caucasian Bluestem**
- **Native Warm Season Grasses**
  - If willing to assume a potentially slow and challenging establishment process
- **Bermudagrass**
  - Seeded or Sprigged
  - Works well as a part of the hay-grazing system
  - High N demand

# Establishing

- **Establishing or renovating**
  - **Reduce weed and existing forage competition**
  - **Establishing – glyphosate burndown; no-till drill insure better seed placement**
  - **Renovating – paraquat burndown for existing grass pasture; mowing or grazing is another option then seeding**
  - **Tillage is an option but avoid erodible areas and monitor weed emergence.**

# Establishing: Spray-Smother-Spray

- Two herbicide applications are needed to kill many perennial forages, especially E+ tall fescue
- If replacing E+ tall fescue, clip seed heads in spring if they are present
- Spray existing forage with a glyphosate (ideally, existing forage is 3 to 4 inches tall and growing)
- Plant a summer annual as a “smother crop”
- In late summer, spray smother crop with glyphosate
- Plant new forage in September



# Establishing

- **Proper seeding date**
  - Environmental conditions adversely influence stand
- **Proper seeding rate**
  - Recommended seeding rates are based on pure live seed
  - factor in estimated loss when conditions are not ideal
- **Proper seeding depth**
  - Soil to seed contact necessary
  - Too deep – can run out of energy
  - Too shallow – root placement and moisture issues

# Drill Seeding

- **Cool Season Grass**
  - September
- **Warm Season Grass**
  - May
- **Legumes: Clover and Alfalfa**
  - Avoid planting same time as grass
  - September



# **Frost Seeding Legumes**

- **Seed broadcast in late winter (February)**
  - Clover and lespedeza
- **Freezing and thawing action plus rain help cover the seed**
- **Not recommended for alfalfa**
- **Seeding Rates, Depths, Dates**
  - MU Guide #4652 -  
<http://extension.missouri.edu/p/G4652>

# Pure live seed (PLS)

$$\% \text{PLS} = (\% \text{Purity} \times \% \text{Germination}) / 100$$

**%Purity = % of seed that is the desired forage seed**

**%Germination = % of seed that germinates when planted**

# Planting Depth

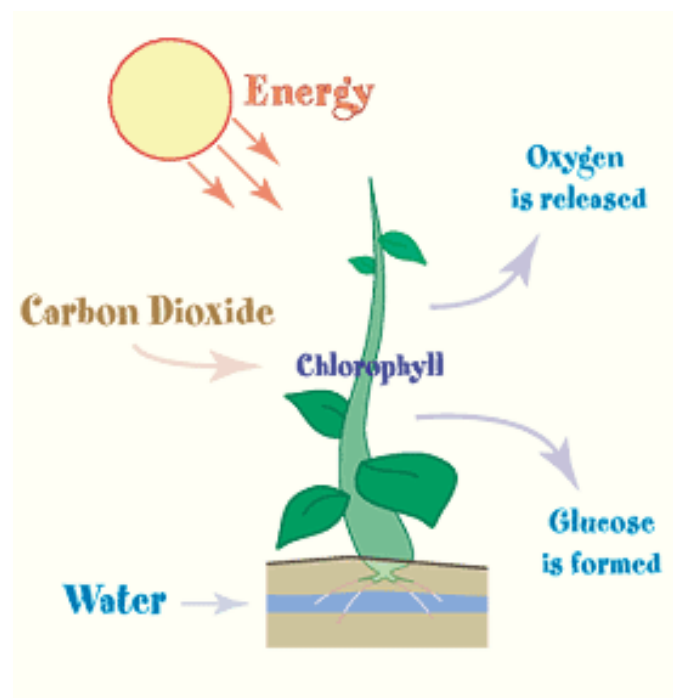
- **Most small seeded grasses and legumes should be planted at  $\frac{1}{4}$  to  $\frac{1}{2}$  inch below the soil surface**





# Plant Nutrients

- 16 essential nutrients
  - Carbon, Oxygen, and Hydrogen most abundant
    - Photosynthesis
- Nitrogen, Phosphorus, and Potassium
  - Plants uptake large amounts
  - Plants can only use certain forms of each nutrient
- Terms
  - Organic = living or once living
  - Inorganic/synthetic = manmade



# **Consequences of Forgoing Nutrient Management**

- **Reduced forage production**
- **Reduced forage quality**
- **Reduced persistence of desirable species**
- **Excessive weeds and brush**
- **Depend on expensive fertilizer to bring field back up to testing standards**

# Should I Fertilize Pastures?

- Soil test levels
- Forage selection
  - CSG vs WSG
  - Legumes
- Forage need & value
  - Stocking density
  - Price of hay



# Am I Fertilizing a Crop of Weeds?

- If a high percentage of the foliage in pastures are weeds, don't give them an edge with fertilizer.
- Decide whether to fertilize, spray or do both



# Phosphorus (P) and Potassium (K)

- **Chemical forms change in soil**
- **Plants uptake:**
  - Phosphorus as phosphate -  $P_2O_5$
  - Potassium as potash -  $K_2O$
- **Not prone to leaching**
- **Clings to soil particle and organic matter**
- **Can be built up in the soil over time**

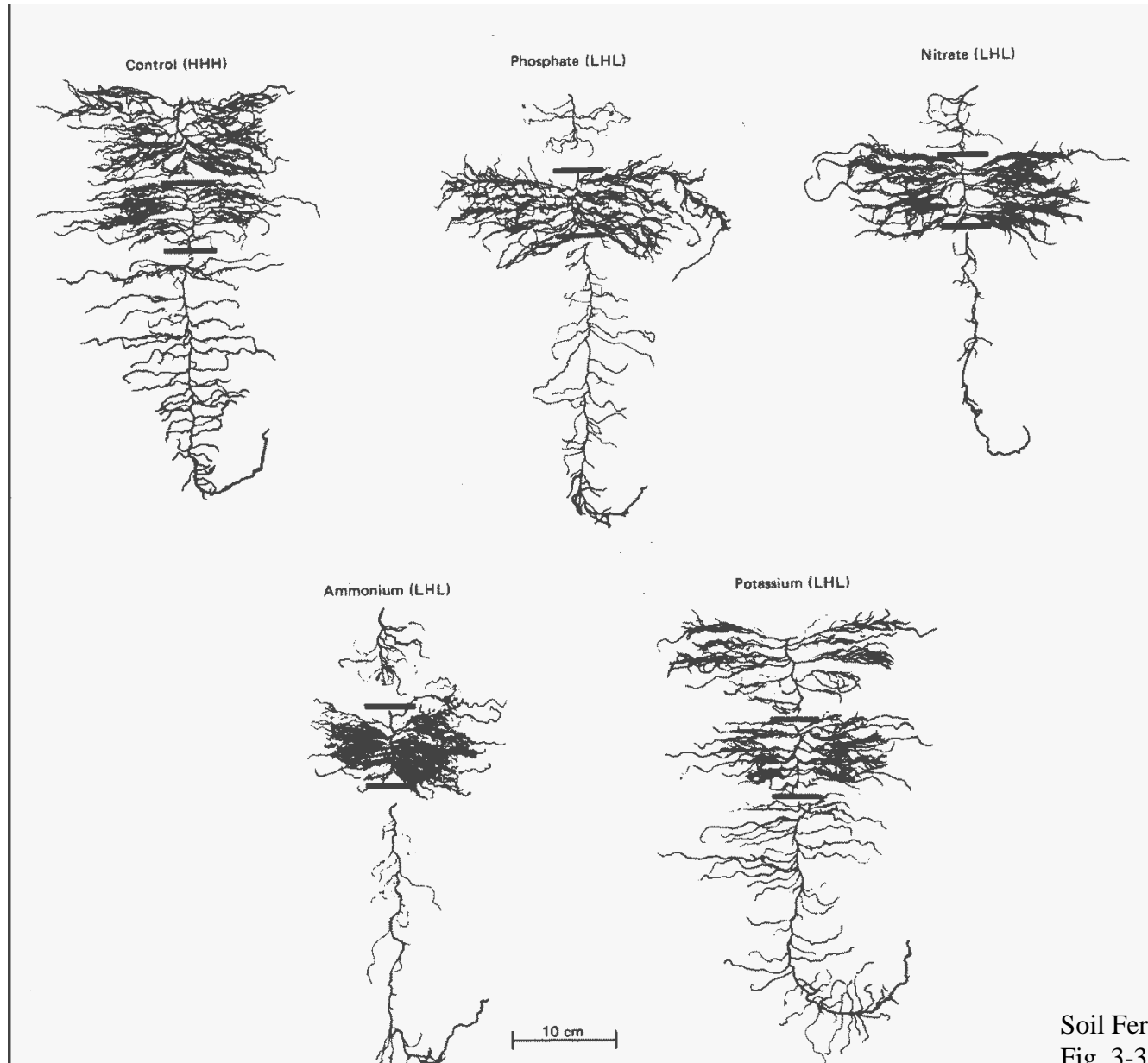
# **Low phosphorus**

- **Poor crop growth**
  - **Critical for energy conversions in plant**
  - **Affects all aspects of growth**
  - **Poor root development**
  - **Low Mg uptake**
- **Poor legume growth**
  - **Reduced survival and activity of N fixing bacteria**

# **Low potassium**

- **Poor crop growth**
  - **inhibition through reduced enzyme activity**
  - **impaired water uptake**
- **Reduced disease resistance**
- **Reduced winter hardiness**

# Nutrients



Soil Fertility and Fertilizers  
Fig. 3-3; p. 65



# Organic Matter

## ■ Improves:

- **Soil Physical Condition**
- **Moisture Holding Capacity**
- **Aeration**
- **Cooler Soils**
- **Internal Drainage**
- **Nutrient Storehouse**
- **Capability**
- **Microorganism Activity**
- **Rooting Depth**



- **A soil that has 4% organic matter contains 80,000 lbs. of organic matter per acre.**
- **For every 1% organic matter, there are approximately 20 lbs. of residual nitrogen per acre. It also holds 3.6 gallons of water held per square yard.**

# Pasture Fertility

- **Fertilizer requirements differ for pastures compared to hay**
  - **75% to 90% P and K returned**
  - **25% to 50% N as manure + urine returned and 50% to 75% lost**
- **40 to 50 lb N to grow 1 Ton of CSG**

# Your Cheapest Fertilizer Source



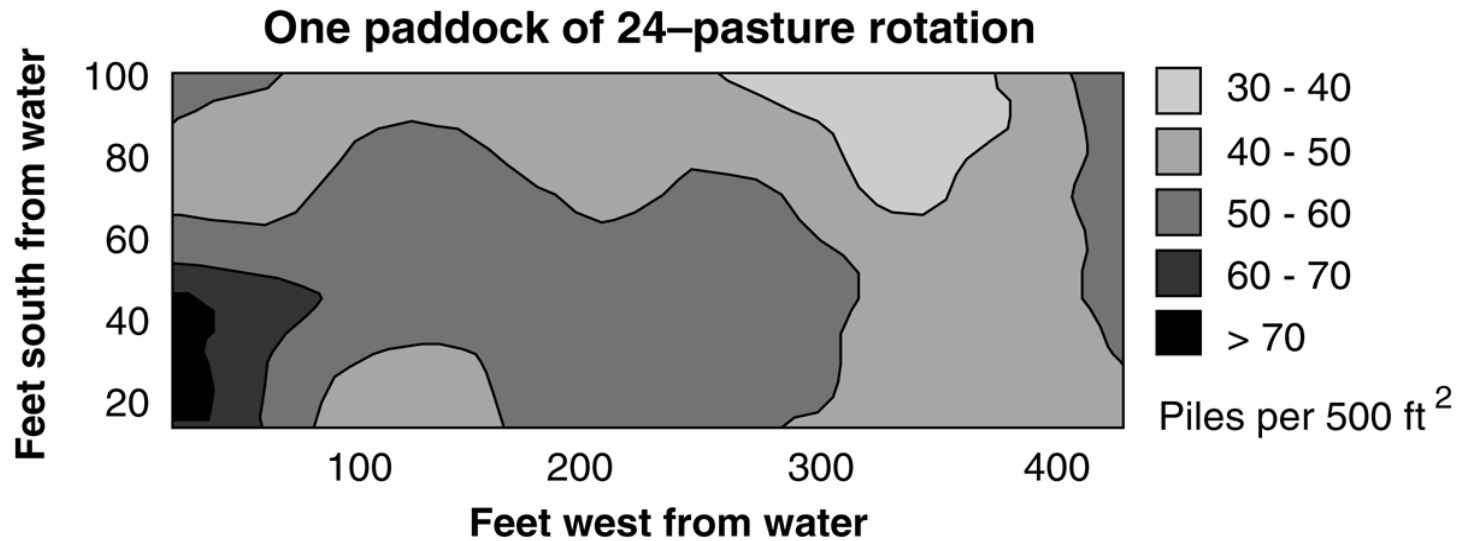
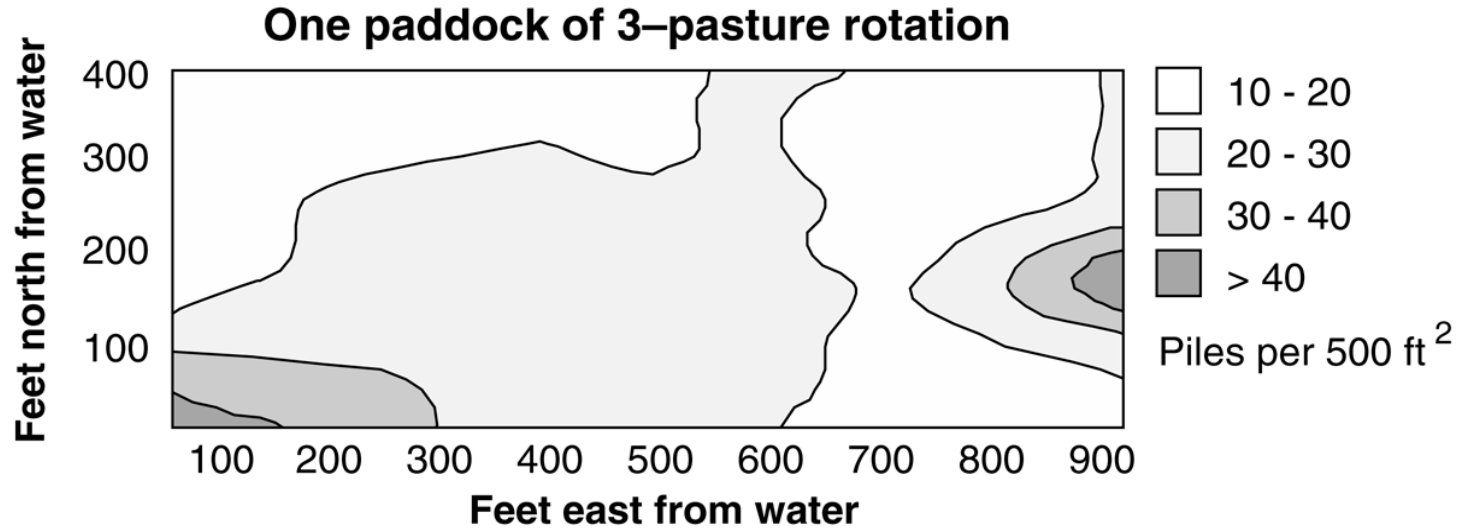
# Excretion by livestock

	Dairy	Steers
Urinations / day	8 - 12	8 - 12
Urine volume (qt)	1.4 - 3.3	0.9 - 2.8
Urine N (lb. / mo.)	5 - 22	5 - 16
Defecations / day	7 - 15	7 - 15
Fecal N (lb. / mo.)	4 - 13	2 - 6

(Whitehead, 1996)



# Improved Manure Distribution







# Improved Manure Distribution

<u>Rotation Frequency</u>	<u>Years to get 1 pile / sq. yard</u>
Continuous	27
14 day	8
4 day	4-5
2 day	2

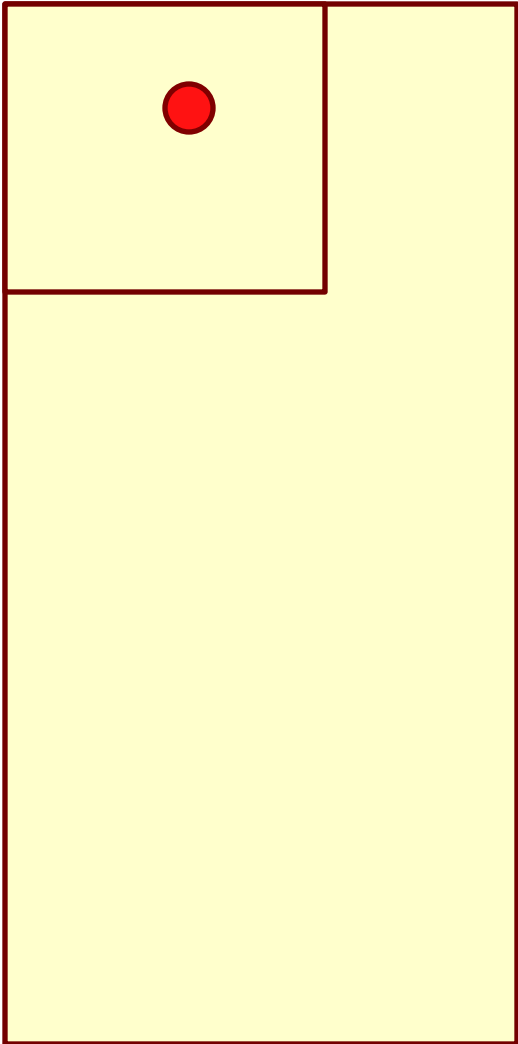
# Hay Feeding Impacts Nutrient Cycling

Forage Systems Research Center Study – Linneus, MO

Investigators: John Lory, Dave Davis, Rob Kallenbach, Justin Sexton

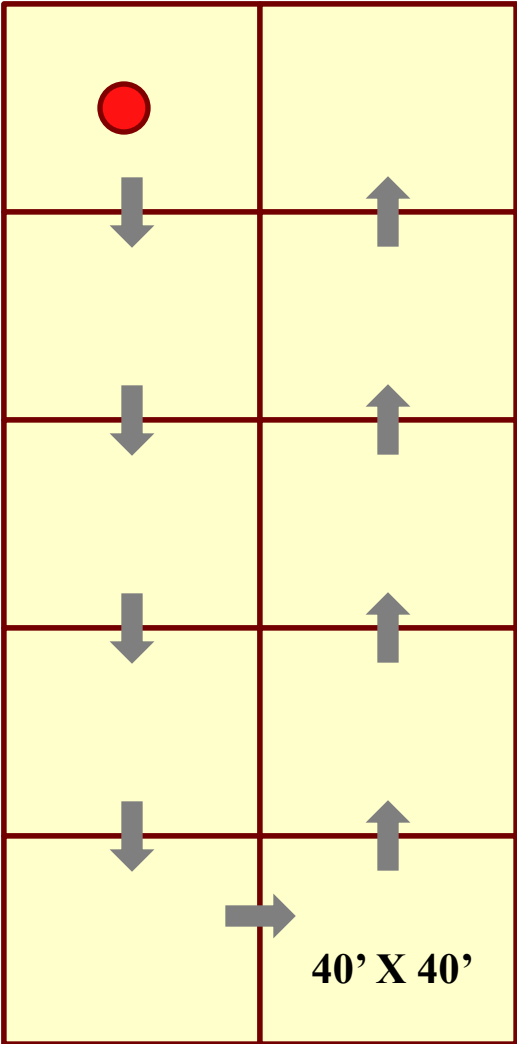
- 3 Treatments; 3 Replications
  - Stationary Hay Rings
  - Moved Hay Rings
  - Bales Unrolled Around Pasture
- 13 cows per treatment with one collared
- 15 fescue bales fed to 13 cows in 42 days

# Treatment 1



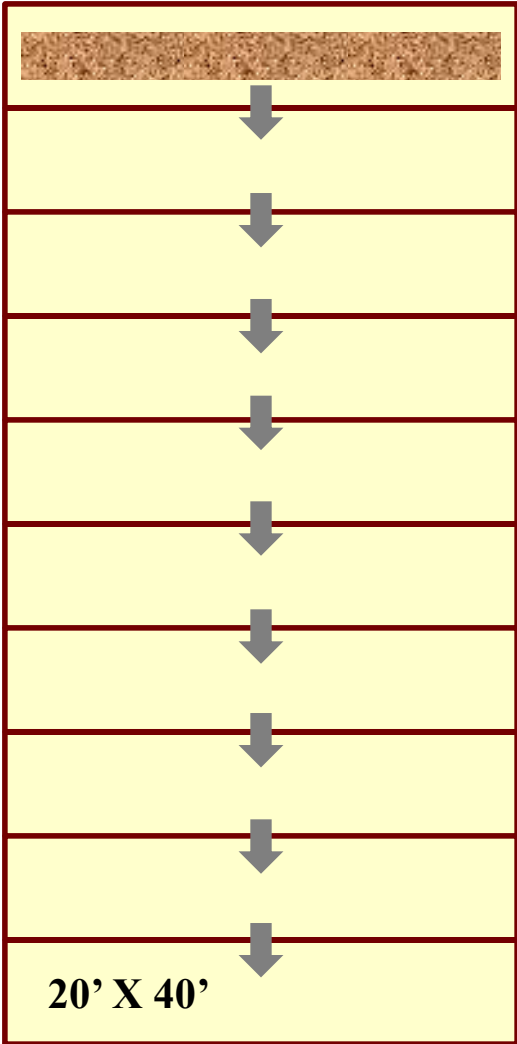
**Hay Ring in Set Feeding Area**

# Treatment 2



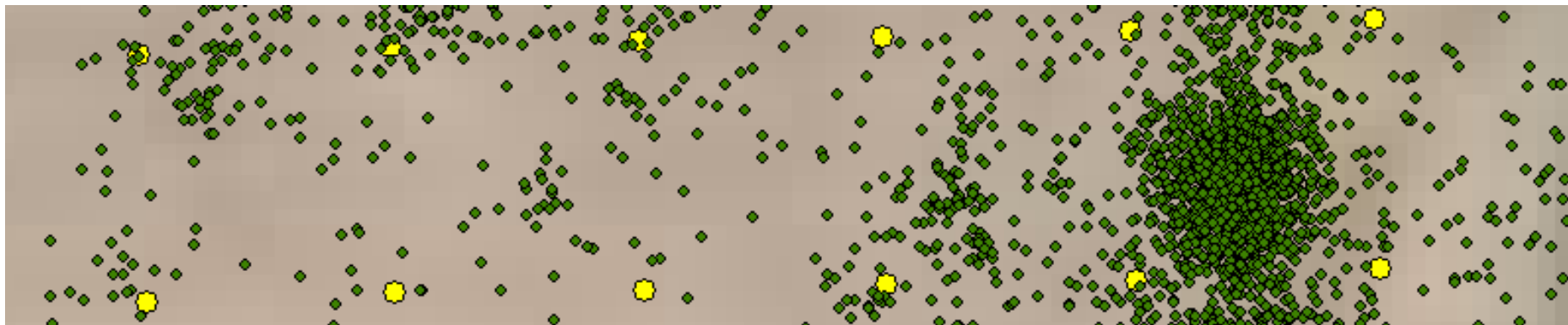
**Move Hay Ring Every Other Day**

# Treatment 3

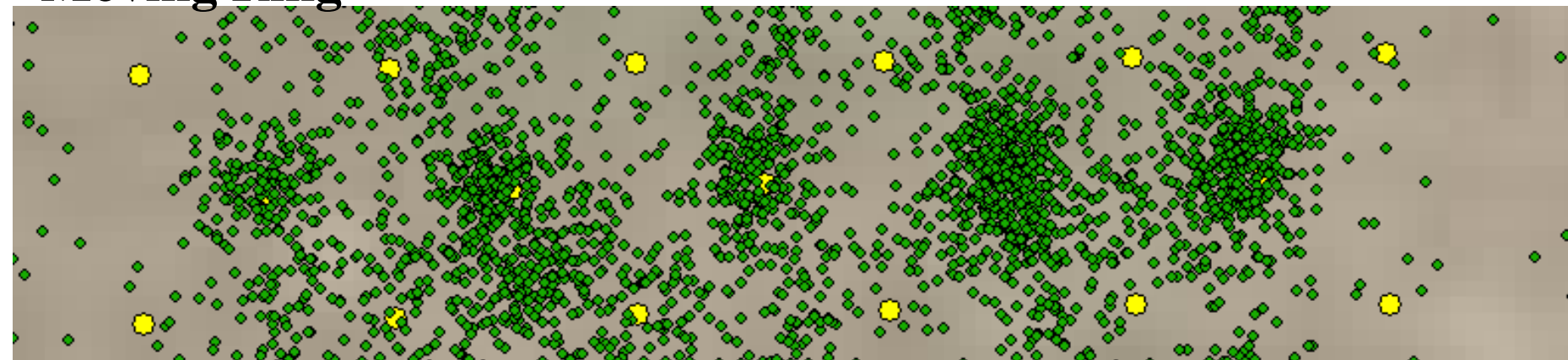


**Unroll Hay in a New Spot Daily**

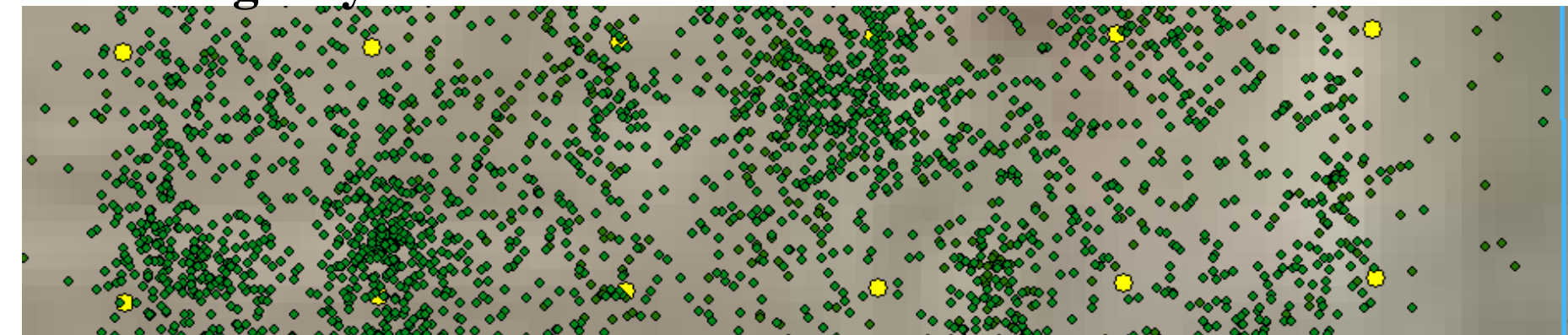
## Stationary Ring



## Moving Ring



## Unrolling Hay



# Move Hay Feeding Sites Often

- Regularly move feeders and feeding areas around the pasture.
- Do not use the same pasture for supplemental feeding every year.
- Do not feed toxic K31 hay in established “novel” endophyte fescue fields.



# Before You Fertilize

## Grazing Management = Utilization



- Continuous grazed systems
  - 30% utilization of forage
  - Animals consume 600 lb. of every ton of forage
- Management intensive grazing
  - 50 to 70% utilization
  - Animals consume 1,000 to 1,400 lb. of every ton of forage

# Fertilizing on a budget

- Target low testing soils.
- Apply lime first.
- Low rates (20 lb.  $P_2O_5$  / acre) on fescue reduces grass tetany.
- Manure can be an excellent fertilizer.
  - Chicken litter, turkey litter or livestock manure.
  - Have manure source tested for accurate application rates.

# Do I need Nitrogen?



- Using legumes?
- Am I intensively grazing?
- Can I cut hay on my pastures in May?
- Do I have more land than cattle to graze it?
- **Does it increase the beef, milk or hay sold on my farm?**



# Overseeding Legumes

- Clover or Lespedeza
- For an annual approach use 4 lb red clover, ½ lb white clover, 8 lb lespedeza
- Use inoculants if minimal legumes are in the pasture
- February seedings better chance than April
- Must maintain pH and phosphate levels for clover



**Goal → 25-30% legume component in pastures**

# N Fertilizer and Legumes

## Do they Mix?



- Not very well
- N fertilizer increases grass growth – competes with legumes
  - Grass smothers legumes
- MU Research
  - 25 lbs/a N reduced lespedeza
  - 100 lbs/a N eliminated it
- Use low rate N only in the fall
  - Improved grass root development
  - Stockpiling fescue

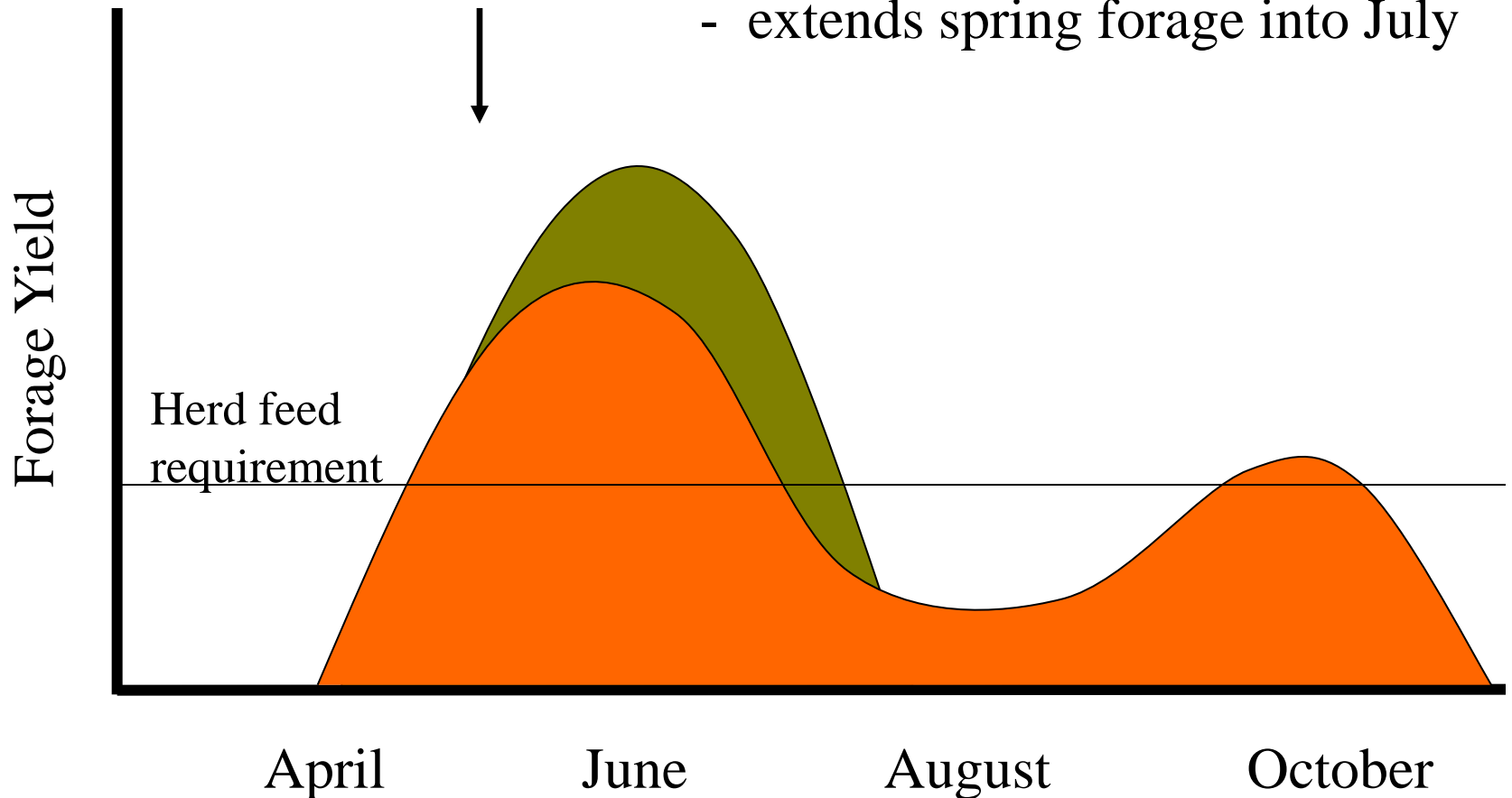
# When Should I Fertilize?

- Fescue Endophyte is most toxic in stems & seed heads.
  - Produced in late spring.
  - N fertilizer in spring produces more stems & seed heads.
  - Strategy: Apply N after initial growth is removed by grazing.
  - Apply N in late spring or fall.

# Nitrogen for Tall Fescue Spring Pasture

Spring fertilization for Pasture:

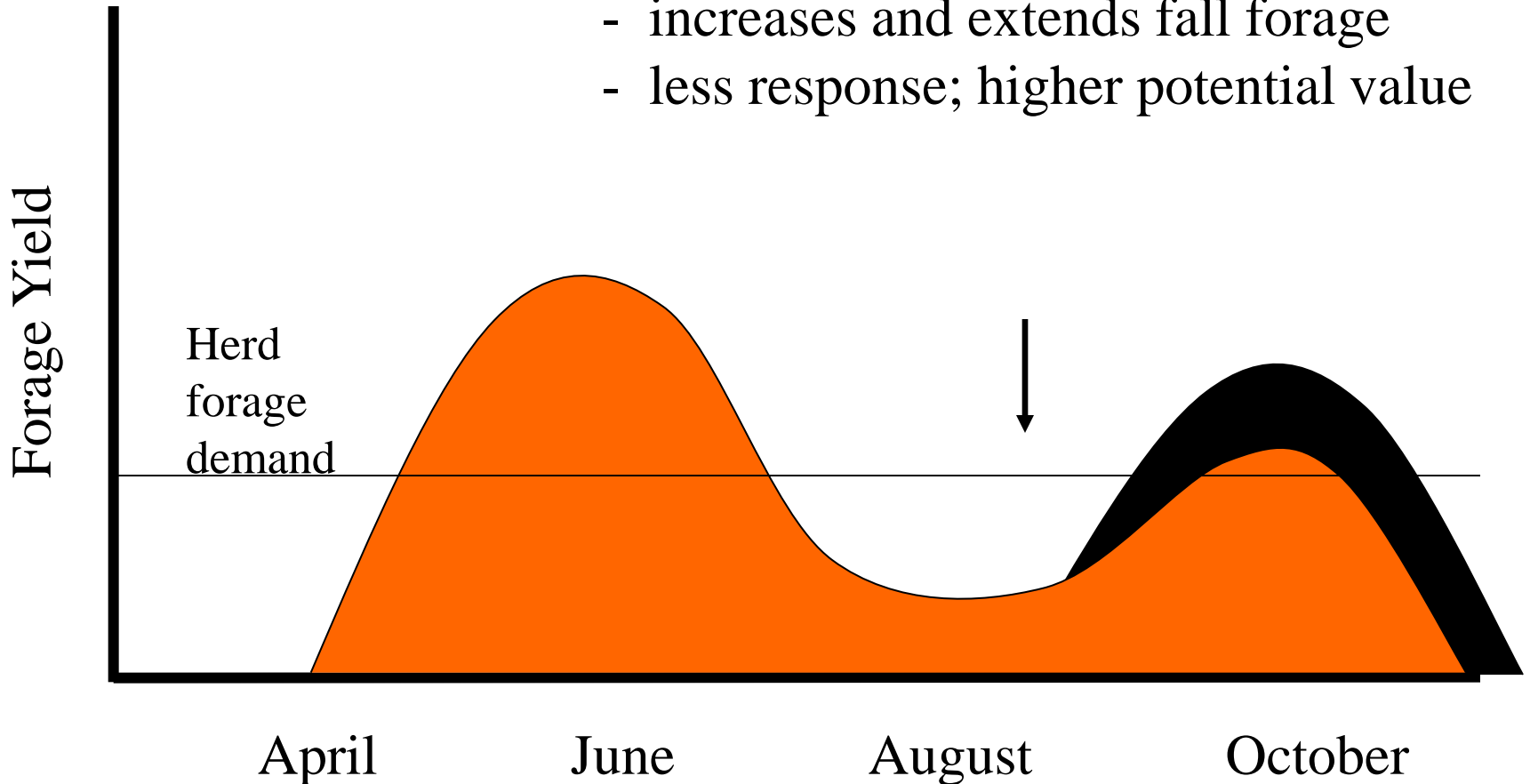
- apply nitrogen in early May
- extends spring forage into July



# Nitrogen for Tall Fescue Fall Pasture

Fall fertilization for Pasture:

- apply nitrogen in mid August
- increases and extends fall forage
- less response; higher potential value



# Surplus Forage into Baleage or Hay



# Weed Control

- **Weeds are opportunists**
  - **Overgrazing + low pH + low fertility = reduced competition of forage plants**
  - **Poor weed control methods only compounds the problem**



# Cattle Response to Weed Control

**Results:**  
**Cattle Grazing Response**





# Albany

Fix Points 4 Months After  
Application (10/28-11/24)

-  Treated – 77%  
(869 fixes)
-  Untreated – 23%  
(328 fixes)



# Weed Control Methods

- **Cultural**
- **Mechanical**
- **Chemical**



# #1 Weed Management Tool

- **Healthy Stand = Competitive**



## #2 Proper Grazing

- Managed Intensive Grazing provides more consistent results compared to continuous grazing systems
- Exception is poisonous weeds and some woody perennials which must be managed with mechanical and chemical control methods

# #3 Timely Mowing

- Mowing is an effective tool in addition to grazing
- Can reduce weed seed production of annuals and biennials
- Can help weaken perennial weeds and used in combination with herbicide management

# #4 Herbicide Applications

- Many cases necessary to shift competitive advantage back to pasture or hay forages
- Many cases cheaper and more effective than mowing
- Must decide if weeds are more numerous than legumes because products that effectively control weeds will control legumes

# **Herbicide Program Failures**

- **1) Spraying Too Early or Late or Not Often Enough**
  - **AKA: Wrong Growth Stage**
- **2) Misidentification of Weed**
- **3) Poor Environmental Conditions**
- **4) Wrong Product or Product Placement**
- **5) Not Calibrating = Coverage and Rate**
- **6) Not Reading Label**

# **1) Too Late More Than Too Early**

- **Usually efficacy corresponds to weed size**
- **Smaller weed = increased control**
  - **Actively growing = receptive to herbicide uptake**
  - **Less energy to recover**
- **There are exceptions for some perennials**
  - **Too early is a negative**
  - **Some require multiple applications**



## **2) Weed ID**

- **Apply Eye Balls per Acre**
  - **Evaluate pastures at proper times**
- **Annuals**
  - **Broadleaf weeds**
  - **Summer and Winter**
- **Biennial/Perennials**
  - **Broadleaf weeds**
  - **Brush**
  - **Sedges**

# Annuals

- **Winter and Summer Annuals**
- **1” to 4” seedlings w/ max size of 10”**
- **Control options w/ two goals**
  - Reduce competition w/ crop
  - Reduce seed production
- **Options: MIG, Mowing, Herbicide**
- **Herbicides: 2,4-D containing products (+dicamba, GrazonNext, Crossbow)**



# Biennials

- **Thistles: Bull, Musk, Tall**
- **Wild Carrot/Queen Anne's Lace**
- **Poison Hemlock**
- **Best Timing = rosette in fall or early spring**
- **Herbicides:**
  - 2,4-D containing products
  - GrazonNext
  - 2,4-D + Dicamba
- **Mowing after bolting (flowering stalk) prior to seed production**



# Perennials

- **Deep perennial root system**
  - **Mowing can help reduce seed production**
  - **Retreatment usually necessary**
- **Tough above ground parts = unpalatable and difficult for herbicide penetration**
- **Control methods: incorporating browsing, cultural, herbicide**
- **Product timing and placement important**
  - **Timing – early summer**
  - **Placement – foliar, basal, cut stump, soil**

# Broomsedge Bluestem

- **Warm Season  
Grass Perennial**
- **Thrives where  
CSG won't**
- **Improve Cultural**
- **Improve Grazing**
- **Spot treat or Rope  
Wick**
  - **Glyphosate**



# **Coralberry/Buckbrush**

- **Perennial w/ creeping underground rootstock**
- **Best Timing = Prior to full leaf in spring**
- **2,4-D (2 qts) or GrazonNext**
- **Mowing – weak option**



# Horsenettle/Bullnettle

- **Perennial w/  
rhizomes**
- **Best Timing**
  - **Vegetative to Fruit**
- **Grazon products**
- **Cimarron Max or  
Chaparral**
  - **tougher on fescue**



# Sericea Lespedeza

- Cultural and Mechanical
  - 7 goats per acre for 3 years
  - Mowing when 12” all season will help
- Chemical
  - PastureGard
  - June = 12” tall
  - August-September = bud to bloom





# Locust

- **Black Locust and Honey Locust**
- **Trees with thorns**
- **Timing and Placement**
  - Foliar – seedlings
  - Basal – up to 6” diameter
  - Cut stump – larger trees
- **Products – triclopyr and picloram containing products**
- **Consider adding petroleum product to mix for cut stump**



# Blackberry

- **Upright and Cane types**
- **Avoid mowing the year of application**
- **Best Timing = fall (late September to early October)**
- **Multiple years usually required**
- **Control – Products containing metsulfuron (Cimarron Max or Chaparral) or triclopyr (PastureGard or Remedy)**



# Poisonous Plants

- **Poisoning**
  - **Depends on availability and quantity of plants**
  - **Stage of growth and time of year**
  - **Kind of animal**
- **Livestock avoidance**
  - **Animals tend to avoid those plants that can cause harm w/ poisoning generally occurring when food sources are limited**
  - **Maintain diverse and vigorous stands of nutritious plants and avoid over-grazing**
  - **Maintain fence rows and barn lots**
  - **Avoid baling areas with populations of poisonous plants prior to controlling**

# Poisonous Plants

- **Perilla Mint**
  - Serrated leaf margin
  - Purple or green leaves
  - Minty odor
- **Acute Respiratory Distress Syndrome**
- **Scout from mid-April to mid-June**
- **Control – 2,4-D containing products (+dicamba, GrazonNext, Crossbow)**
- **Mowing before seed production**
- **<https://utextension.tennessee.edu/publications/Documents/W135.pdf>**



# Poisonous Plants

- **Cocklebur**
- **Red/Black specks on mature stem**
- **Egg shaped bur w/ curved spines**
- **Control – 2,4-D containing products (+dicamba or GrazonNext)**



### 3) Spray When Conditions Are Right

- **Wind < 10 MPH  
but not perfectly  
still**
- **Drought stress =  
limited uptake**
- **Temp above 50 F**



# **4) Product Selection and Placement**

- **Select Based on Weed Rating Guides**
- **Will have to weigh the amount of desirable broadleaves to junk**
  - **Legumes at 20%?**
  - **Dominating weeds = lower quality + potential health risks**
- **Placement**
  - **Foliar: Broadcast or Spot**
  - **Basal Bark: Ground up 24”**
  - **Cut Stump: Fresh**

# 5) Calibration

- **Calibration = covering the plant part with proper amount of product**
- **Calibration Guide:**  
<http://extension.missouri.edu/p/G1270>
- **$5940 = (43,560/88)*12$**

$$GPM = \frac{GPA * MPH * WIDTH}{5940}$$



# 6) Read The Label

- Label = Law
- Contains
  - Active Ingredient
  - Application Rate
  - Delivery Methods
  - Safety Precautions
  - Target Pests
  - Surfactants Needed

## Specimen Label



### Specialty Herbicide

\*Trademark of Dow AgroSciences LLC

For controlling unwanted trees via cut surface treatments in forests and non-cropland areas such as fenceows, roadsides, and rights-of-way.

Not for sale, distribution or use in Nassau and Suffolk Counties in New York State

Active ingredient(s):	
picloram - 4-amino-3,5,6-trichloropicolinic acid,	
trisopropylamine salt.....	5.4%
2,4-dichlorophenoxyacetic acid,	
trisopropylamine salt.....	20.9%
Other ingredients.....	73.7%
Total.....	100.0%

Acid equivalent:	
picloram - 3.0%	
2,4-dichlorophenoxyacetic acid - 11.2%	

### Precautionary Statements

Hazards to Humans and Domestic Animals

EPA Reg. No. 62719-31

### CAUTION

Causes moderate eye irritation \* Harmful if Swallowed or Absorbed Through Skin

Avoid contact with skin, eyes or clothing.

#### Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are made of any waterproof material. If you want more options, follow the instructions for category A on an EPA chemical resistance category selection chart.

All loaders, applicators, and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes and socks
- Chemical-resistant gloves

See engineering controls for additional requirements

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

#### Engineering Controls Statements

When handlers use closed systems in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.242(d)(4)), the handler PPE requirements may be reduced or modified as specified in the WPS.

#### User Safety Recommendations

- Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
  - Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
  - Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

#### First Aid

If in eyes: Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-922-5934 for emergency medical treatment information.

Note to Physicians: Contains ethylene glycol.

#### Environmental Hazards

This pesticide is toxic to some plants at very low concentrations. This pesticide may be toxic to fish and aquatic invertebrates. Non-target plants may be adversely affected if pesticide is allowed to drift from areas of application. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

Picloram is known to leach through soil into ground water under certain conditions as a result of agricultural use. 2,4-D has properties and characteristics associated with chemicals detected in groundwater. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination. Application around a stream or well may result in contamination of drinking water or groundwater.

This chemical can contaminate surface water through spray drift. Under some conditions, picloram may also have a high potential for runoff into surface water (primarily via dissolution in runoff water). These include poorly draining or wet soils with readily visible slopes toward adjacent surface waters, frequently flooded areas, areas over-lying extremely shallow ground water, areas with in-field canals or ditches that drain to surface waters, areas not separated from adjacent surface waters with vegetated filter strips, and areas over-lying tile drainage systems that drain to surface water.

#### Physical or Chemical Hazards

Combustible. Do not use or store near heat or open flame.

#### Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all Directions for Use carefully before applying.

Use undiluted only as indicated below.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

#### Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about Personal Protective Equipment (PPE), and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

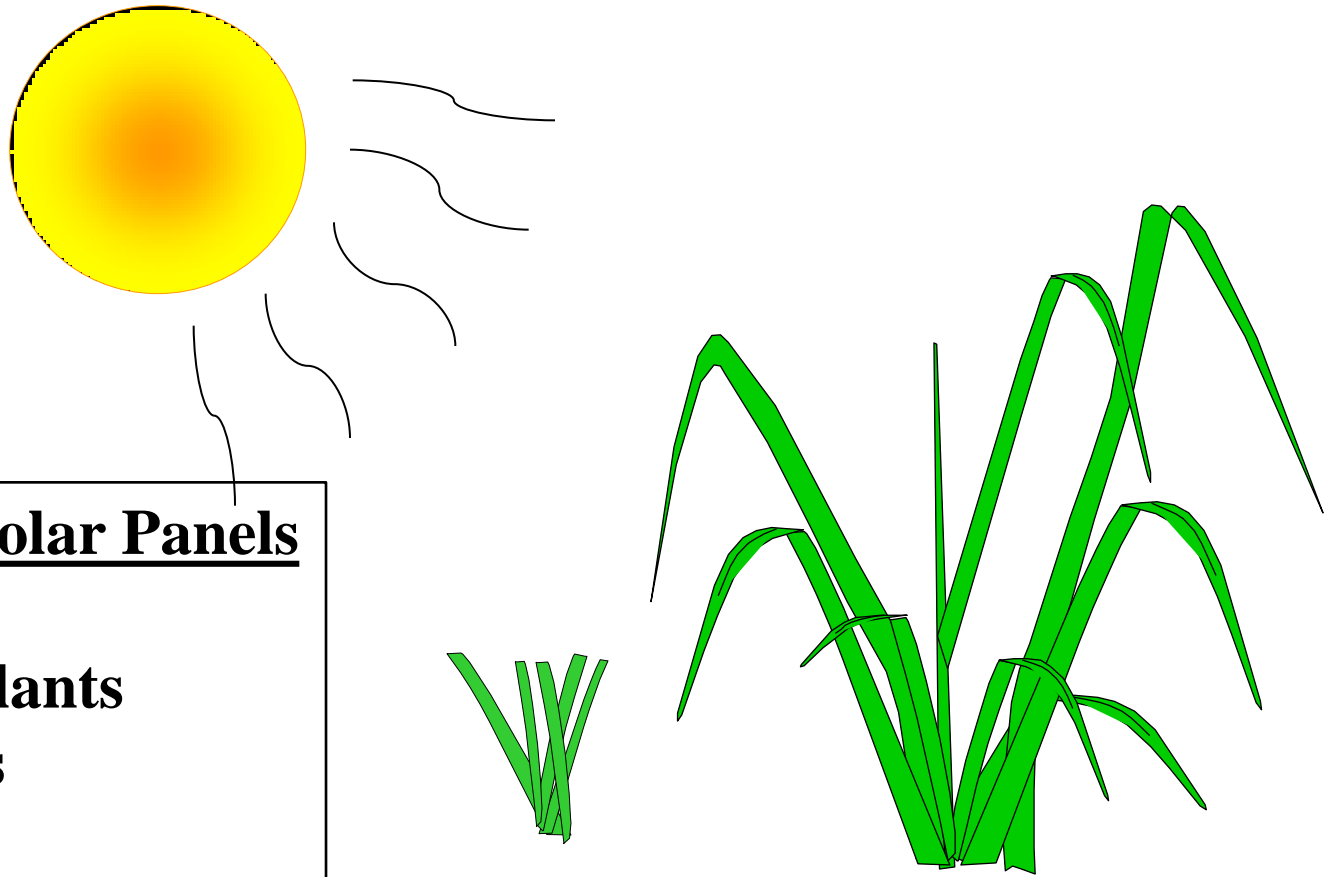
Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

REI required for entry into or treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Chemical-resistant gloves made of any waterproof material
- Shoes plus socks
- Protective eyewear

- **Manage for Persistence, Quality, Yield**
  - **Soil sampling**
  - **Species selection & establishment**
  - **Nutrient management**
  - **Controlling competition**
- **Grazing management**

# Grazier – “Solar Panel Manager”



## Undesirable Solar Panels

**Bare Soil**

**Overgrazed Plants**

**Mature Plants**

**Weeds**

# Management-Intensive Grazing

Incorporates a grazing strategy and rest periods

- Persistence increases
- Quality & quantity increases
- Enhanced forage utilization
- Weed pressures subside

<u>Percent of Rest</u>	
Paddock #	
0	0%
2	50
4	75
10	90

# **Manage for Persistence**

## **During grazing periods: control stubble height**

- Keep growing points
- Provide for good photosynthesis
- Keep roots growing

## **Between grazing periods: schedule rest periods**

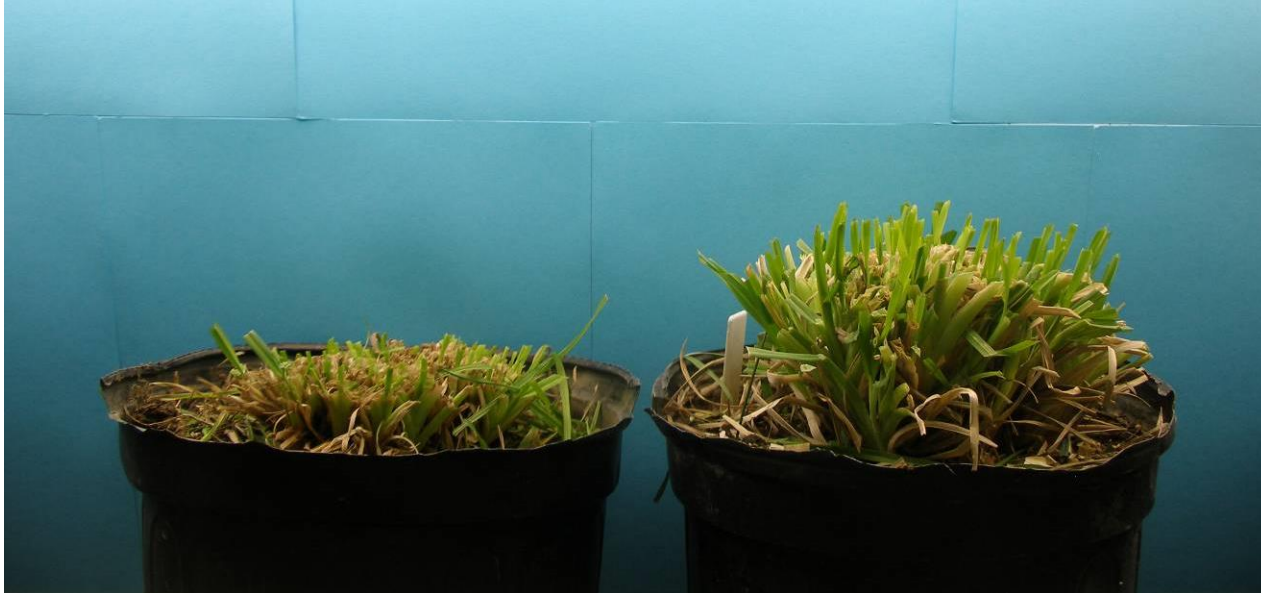
- Allows for photosynthesis
- Allows leaves to regrow
- Maintains vegetative production

# University of Kentucky Simulated Grazing Study

Day 1

(24 hours after clipping)

1” Continuous      3.5” Rotational



# Day 2

1" Continuous      3.5" Rotational



# Day 5

1" Continuous      3.5" Rotational





# Corresponding Root Growth

<b>% Leaf Removed</b>	<b>% Root Growth Stopped</b>
10	0
20	0
30	0
40	0
50	2 to 4
60	50
70	78
80	100
90	100

**To remain healthy, 30% of grass root systems must be replaced annually**

**← Stops root growth 12 days**  
**← Stops root growth 18 days**

# What happens to the roots?



- When grazed, plants “self-prune” their roots so that they can be supported by above ground structures
- The pruned roots decompose into valuable OM

A black cow with a white patch on its forehead and a yellow ear tag is grazing in a field of green grass. The cow's head is lowered towards the grass, and its mouth is open as it eats. The background is a dense field of green grass.

# Forage Quality

**Working definition:**  
“high protein, low fiber”

**Directly related to INTAKE**

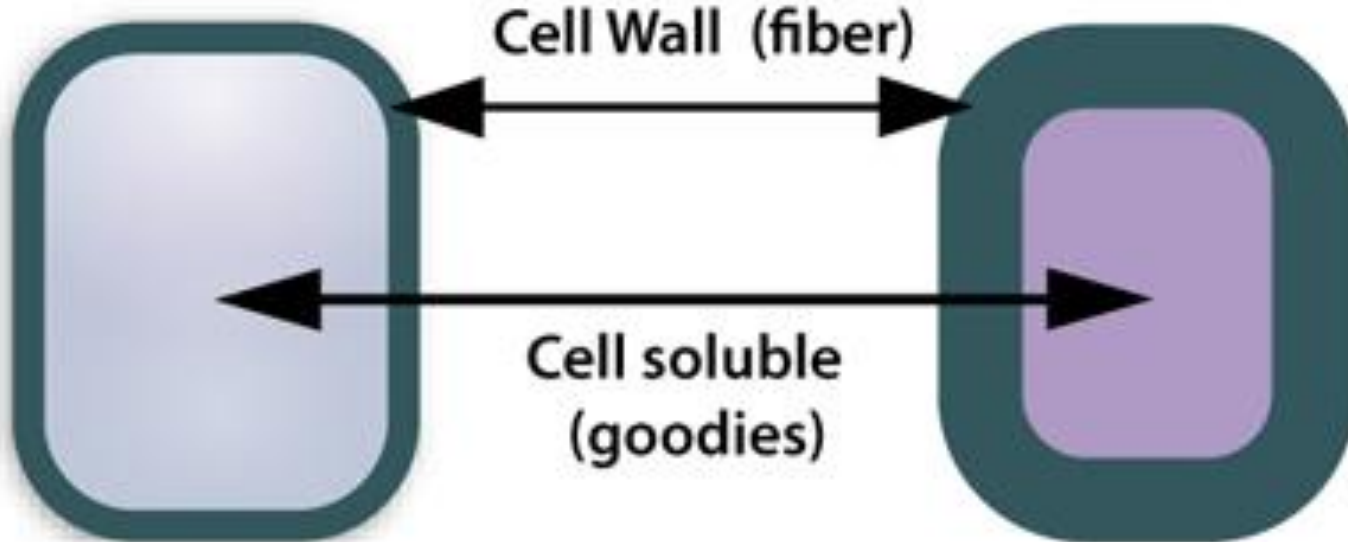
# 3 Factors Affecting Quality

- 1. Maturity**
- 2. Plant Part**
- 3. Species**

# Maturity: Time of Harvest

Early Harvested Forage

Late Harvested Forage



**Thin Cell Wall**

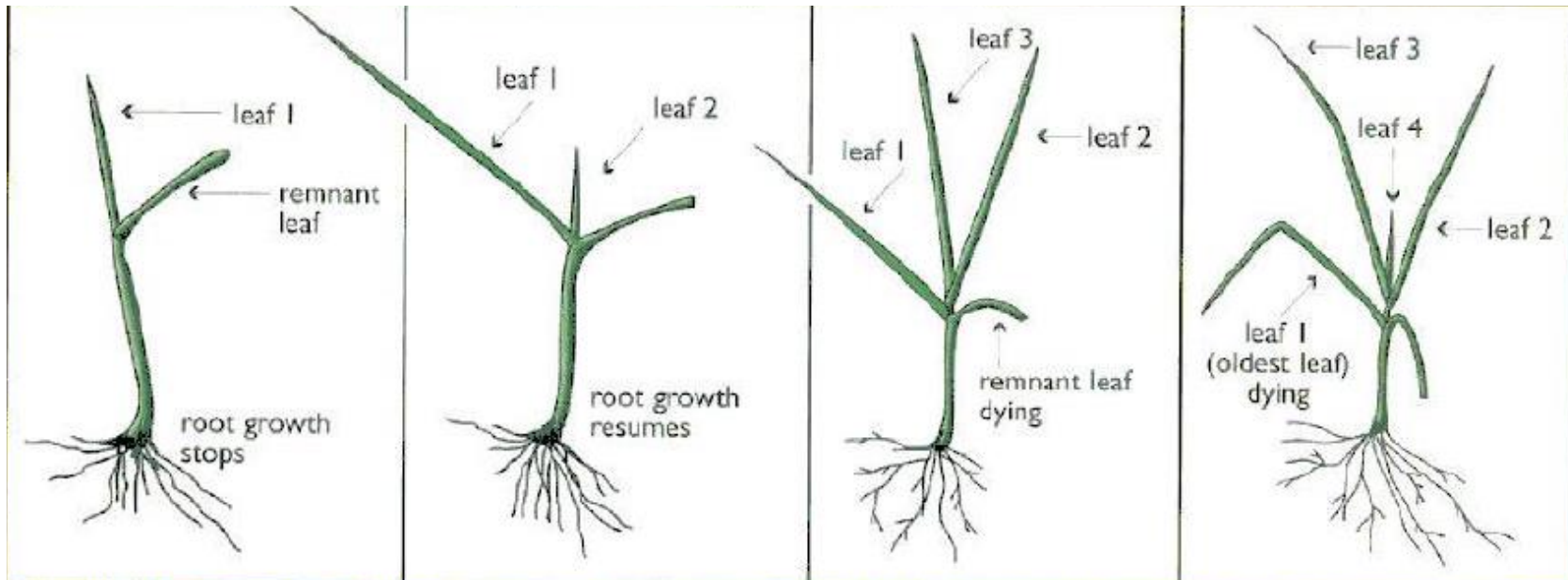
Low NDF = high intake

Low ADF = high energy

**Thick Cell Wall**

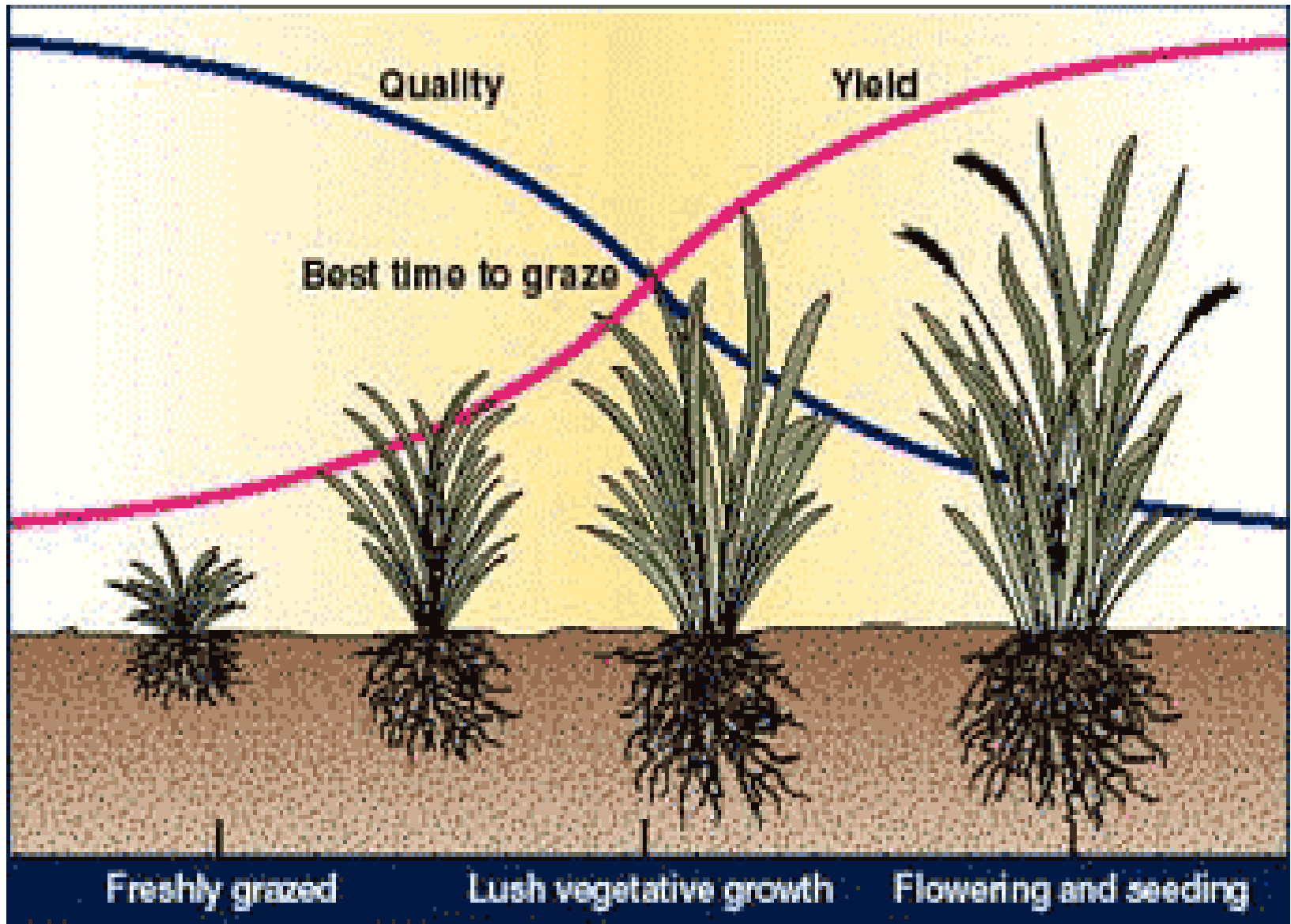
High NDF = low intake

High ADF = low energy



- **When the 4<sup>th</sup> leaf emerges, the first leaf begins to die**
- **Most grasses will have no more than 3 live leaves at any point in time**
- **Grass maintained in vegetative state is more productive**
- **Pasture quality begins to decline and is wasted**

# Plant Part



# Pasture Forage Quality Readings

479 samples from W. Virginia pastures

Pasture Nutrient Quality	Height	CP	ADF	NDF	TDN	RFV
	Inches	% Dry Matter				
<b>High</b> 75 Percentile	7.5	21.9	27.3	47.5	67.0	132
<b>Ave.</b> 50 Percentile	5.0	18.6	30.9	52.1	64.1	115
<b>Low</b> 25 Percentile	3.0	15.3	33.8	56.9	60.5	102

1997-2001 Growing Seasons (samples taken monthly during growing season)  
Most samples consisted of a mix of fescue, bluegrass, orchardgrass and clovers



# Effect of Stage of Harvest on Fescue Hay Quality and Animal Gain

Stage of Harvest	DM Intake lb/day	% Digestibility	% Protein	Lb of hay fed per lb of gain	Lb of hay per acre 1 <sup>st</sup> cutting	ADG
Late boot to head, cut May 3	<b>13.0</b>	<b>68</b>	<b>13.8</b>	<b>10.1</b>	<b>1334</b>	<b>1.39</b>
Early bloom stage, May 14	<b>11.7</b>	<b>66</b>	<b>10.2</b>	<b>13.5</b>	<b>1838</b>	<b>0.97</b>
Early milk stage – seed forming, May 25	<b>8.6</b>	<b>56</b>	<b>7.6</b>	<b>22.5</b>	<b>2823</b>	<b>0.42</b>

Source: Mont Montgomery  
Univ. of TN  
500 lb Holstein Heifers

# Summary

- Soil Sample your fields properly and routinely
- Establish a balanced forage system
  - Extended grazing; Consider replacing toxic K31
- Spread your cheapest fertilizer
  - Apply N when need extra forage
    - August for stockpiling
  - Maintain P and K levels
- Livestock prefer good weed control
- Timely grazing and/or hay harvest critical
  - Persistence and Quality