



Grazing Cropland and Grassland

Objectives

1. Describe advantages and challenges of grazing cropland and perennial grassland
2. Describe impacts of grazing cropland and perennial grassland on soil function and animal performance
3. Describe the principles of adaptive grazing management
4. Explain management strategies for grazing cropland and perennial grassland

Advantages Grazing Cropland

- Livestock manure as primary source of nutrients for crop production cycling nutrients from crops through animals and back to land*
- Biological acceleration, improving soil health at faster rate
 - Add biology
 - Incorporation of organic matter
- Additional source of income
- Increased nutrient cycling (C/N ratio impacts)



Marlon Winger, USDA-NRCS

Advantages Grazing Cropland



No-Till Farmer

- Increase mycorrhizal fungi abundance
- More rapid building of soil aggregates
- Improved infiltration
- Salinity remediation; grazing can better utilize areas where perennial vegetation is required
- Minimize import of feedstuffs to farm*

Advantages Grazing Cropland

- Potential increase in diversity of insects to help reduce pest species
- Livestock serve as a sink for agricultural byproducts*
- Encourages establishment of perennial forages as the primary feedstuff for ruminant livestock*



King's Agriseeds

Challenges Grazing Cropland



Megapixel.com

- Lack of knowledge/familiarity about:
 - Livestock management/herd health
 - Equipment/infrastructure needed; how to use
- Increased time/level of management to prepare operation, move fence, livestock, water, etc.
- Lack of grazing infrastructure: no fences, fences in poor condition, no water nearby

Challenges Grazing Cropland

- Potential hassle working out lease agreement with livestock owner
- Potential risk of livestock not being moved frequently enough causing compaction
- Liability if livestock cause accident on public roads



No-Till Farmer

Impacts on Soil Health

- Research grazing cover crops:
 - MN and IA: ↑ fertility, total organic carbon, inorganic C, total C, total living microbial biomass
 - GA: grazing cover crops did not cause substantial physical damage to soil
- Research grazing crop residues:
 - IA in winter: utilizing corn stover as an inexpensive feed source is a viable option; posing minimal reductions to soybean yield
 - NE in fall and spring: long-term corn residue grazing had little to no effect on soil properties and did not affect crop yields

Impacts on Soil Health

- On-farm field testing in ND grazing cover crops with no-till compared to farms without cover crops and/or no-till:
 - 7 times higher N
 - 4 times higher P
 - 9 times higher K
 - 4 times higher water extractable organic carbon
 - 4 times higher OM
 - 43 times higher water infiltration



Brown's Ranch

Impacts on Soil Health

- Research on grasslands in TX – compared to heavy or light continuous grazing, multi-paddock grazing offered:
 - Greater soil cover
 - Lower soil penetration resistance
 - Lower sediment loss
 - Higher OM and CEC
 - Increased fungal population



Texas A&M University

Impacts on Soil Health

- On-farm trial in MS comparing high stock density rotational grazing to continuous grazing:
 - Several times higher total soil carbon in topsoil and subsoil
 - Significantly greater soil organic matter in topsoil and subsoil



Joyce Farms

Something to Ruminant About



Marlon Winger, USDA-NRCS

- What are some advantages for grazing cover crops?
- What are some challenges grazing cover crops? How can they be overcome?



Carolyn Wong, USDA-NRCS

What are Some Advantages from Grazing Grasslands for Soil Health?

- High quantity & quality forage for livestock from perennials
- Grazing providing for adequate leaf area:
 - Protects soil from raindrop impact
 - ↓ Evaporation
 - ↑ Infiltration
 - Improve plant vigor
- Maintains/improves plant diversity

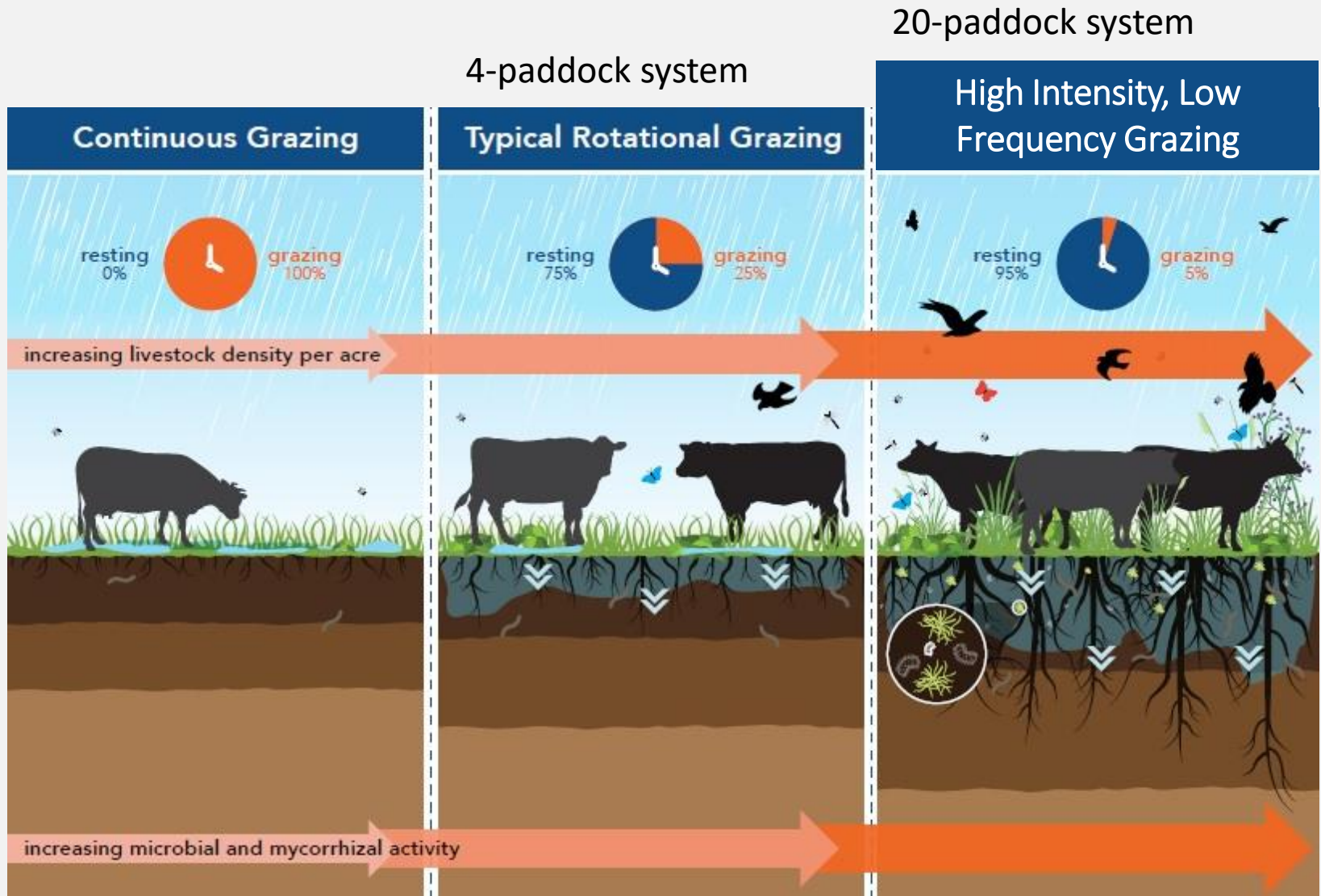
What are Some Advantages from Grazing Grasslands for Soil Health?



Carolyn Wong, USDA-NRCS

- ↓ Need for mechanical harvest
- Biological acceleration, improving soil health at faster rate
 - Add biology
 - Incorporation of organic matter
- ↑ Nutrient cycling (C:N ratio)
- Improve animal health

Effect of Recovery Period



Modified from the Pasture Project

Impacts of Grazing Grasslands for Soil Health

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

When You Overgraze the Shoot You Overgraze the Root!



Tall Fescue
Rotational

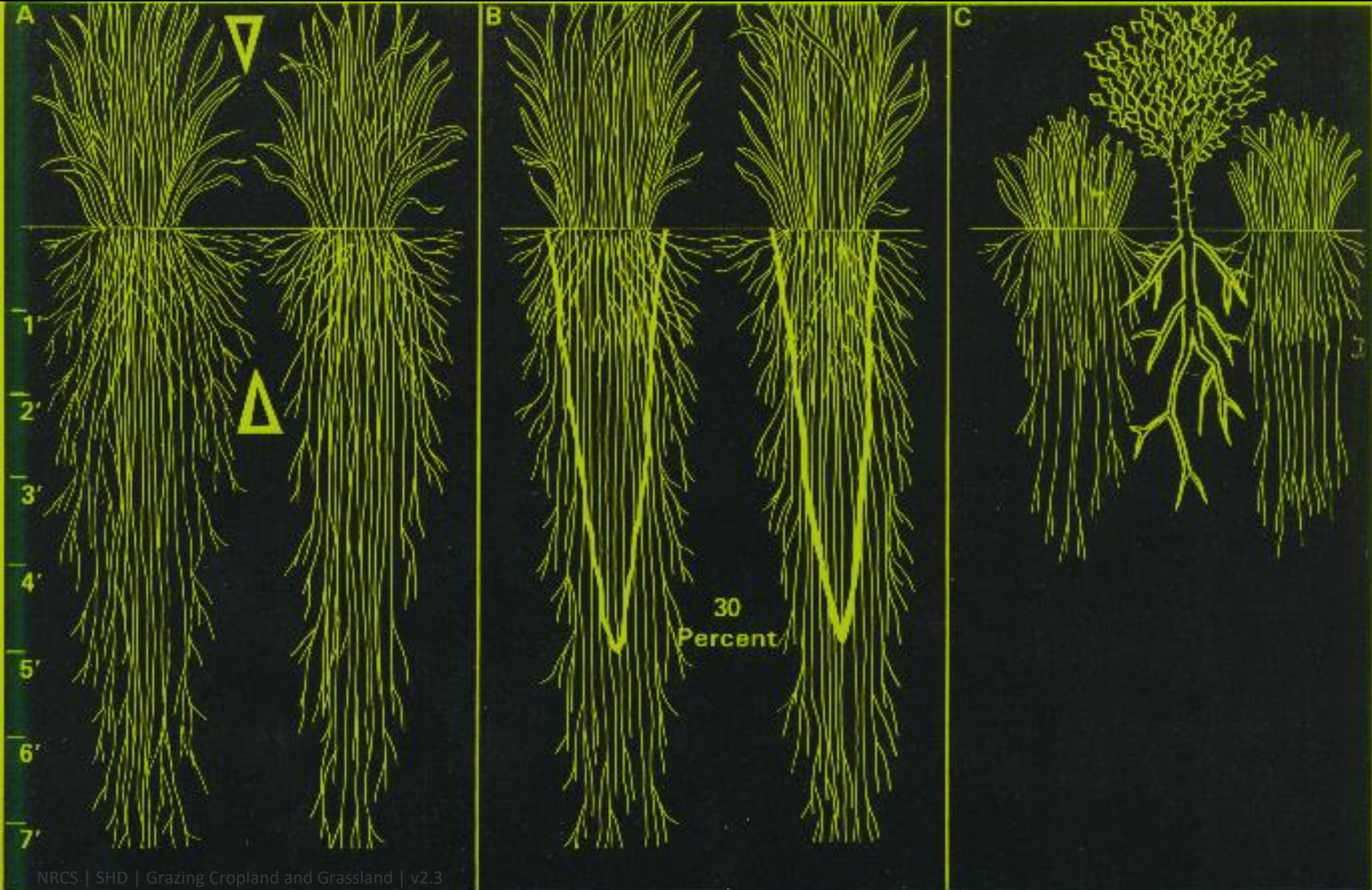
Tall Fescue
Continuous

Tall Fescue
Continuous

Orchardgrass
Rotational

Orchardgrass
Rotational

Fescue/Bluegrass
Rotational



Leaves – The Facts of Growth



 **Roots uptake and send water, minerals, and micronutrients to leaves.**

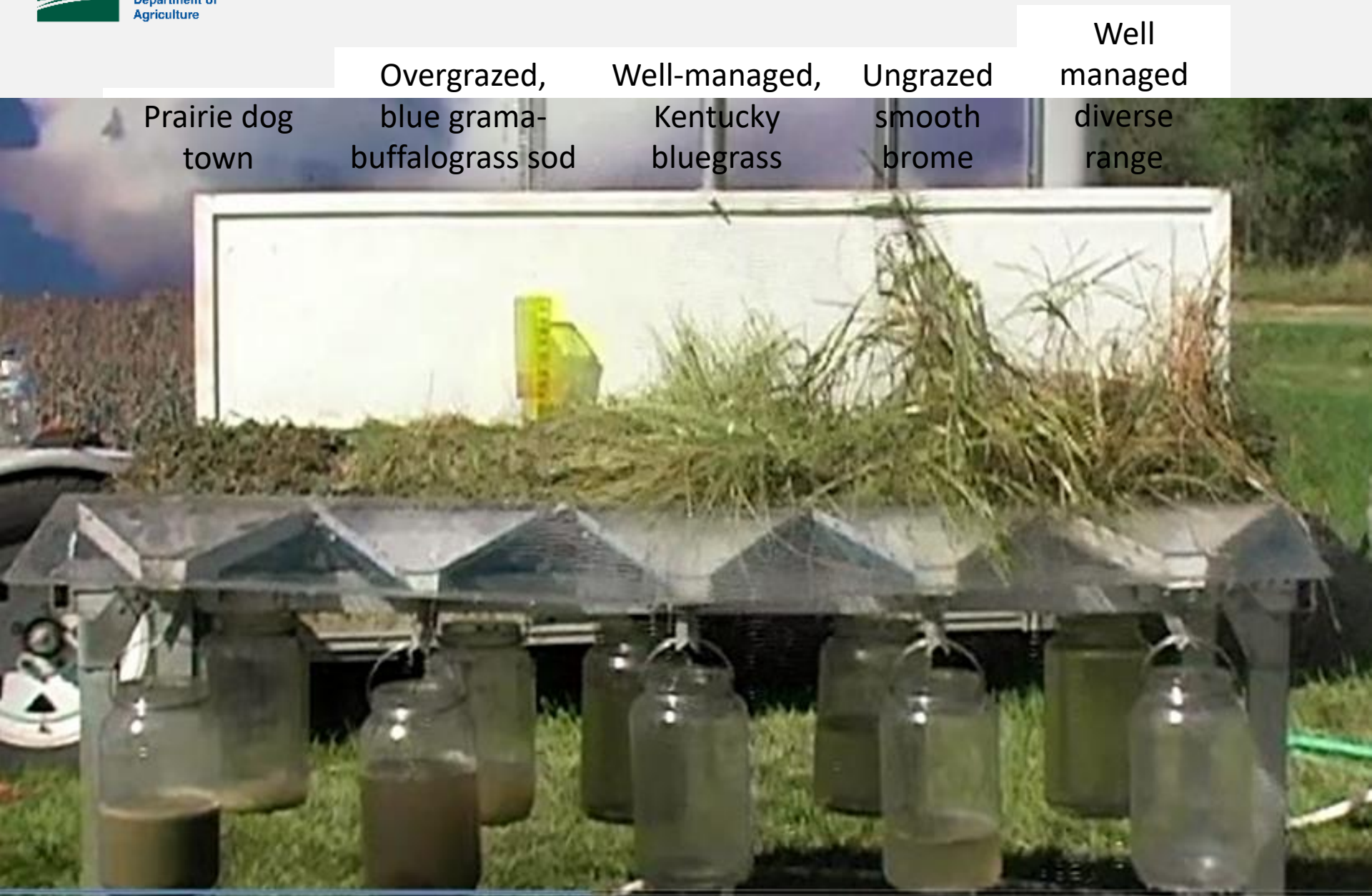
 **Roots DO NOT transport carbohydrates to the leaves.**

 **Leaves use carbohydrates to respire.**

 **5-10% of new leaf growth is from residual sheath & crown carbohydrate reserves.**

 **90-95% of new leaf growth comes from carbohydrates resulting from current photosynthesis.**

 **Bottom line – it takes leaves to make leaves.**



Prairie dog town

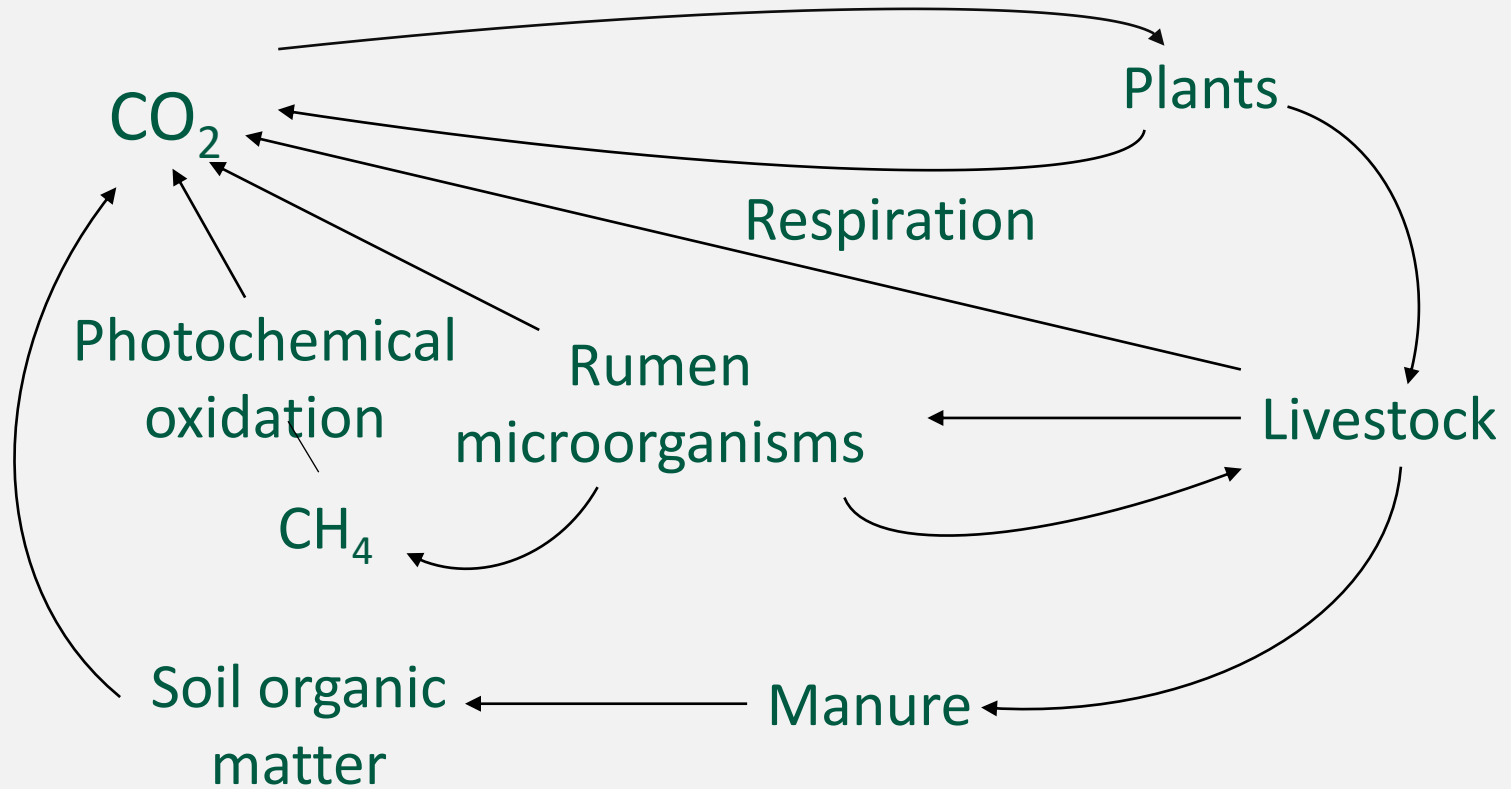
Overgrazed, blue grama-buffalograss sod

Well-managed, Kentucky bluegrass

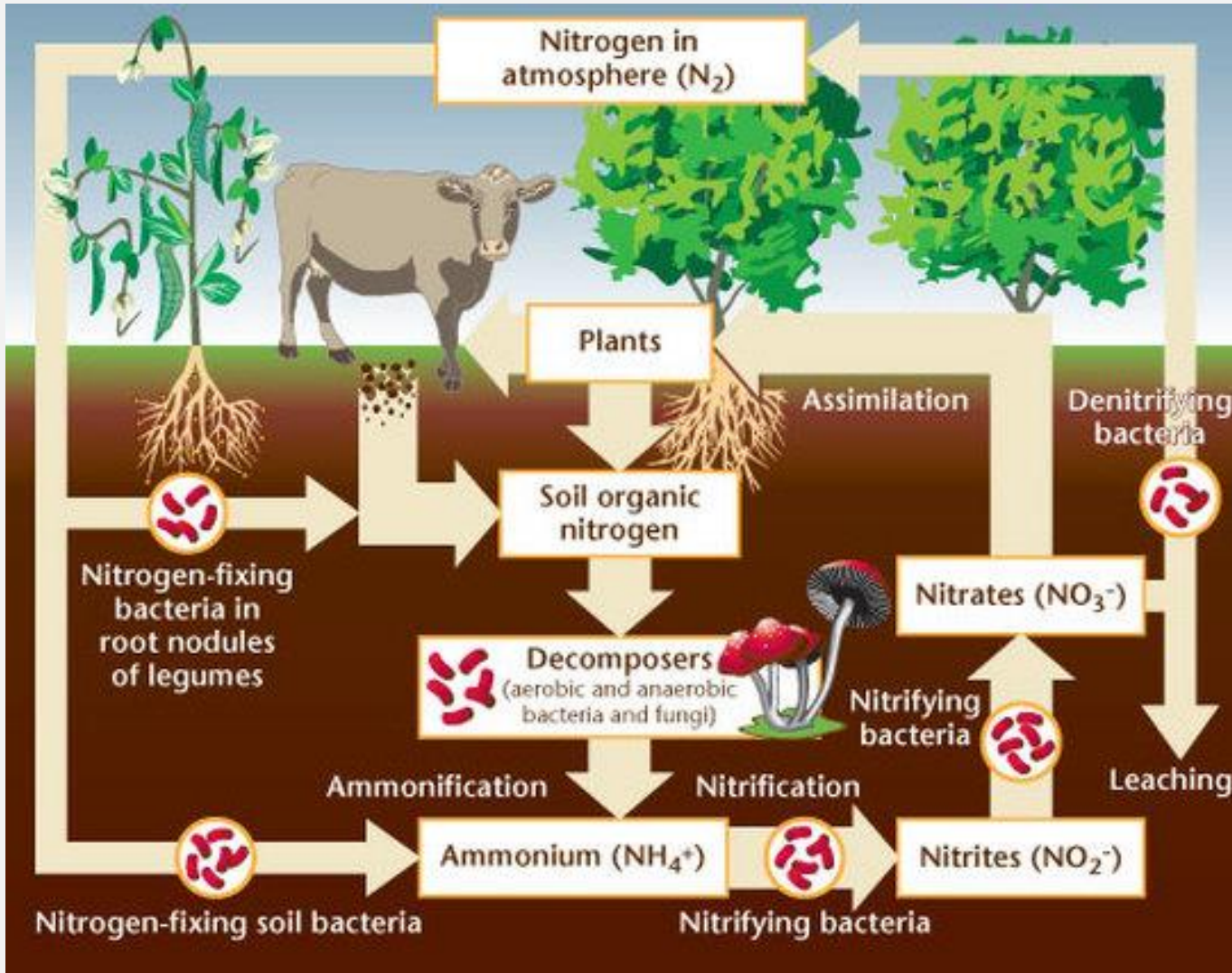
Ungrazed smooth brome

Well managed diverse range

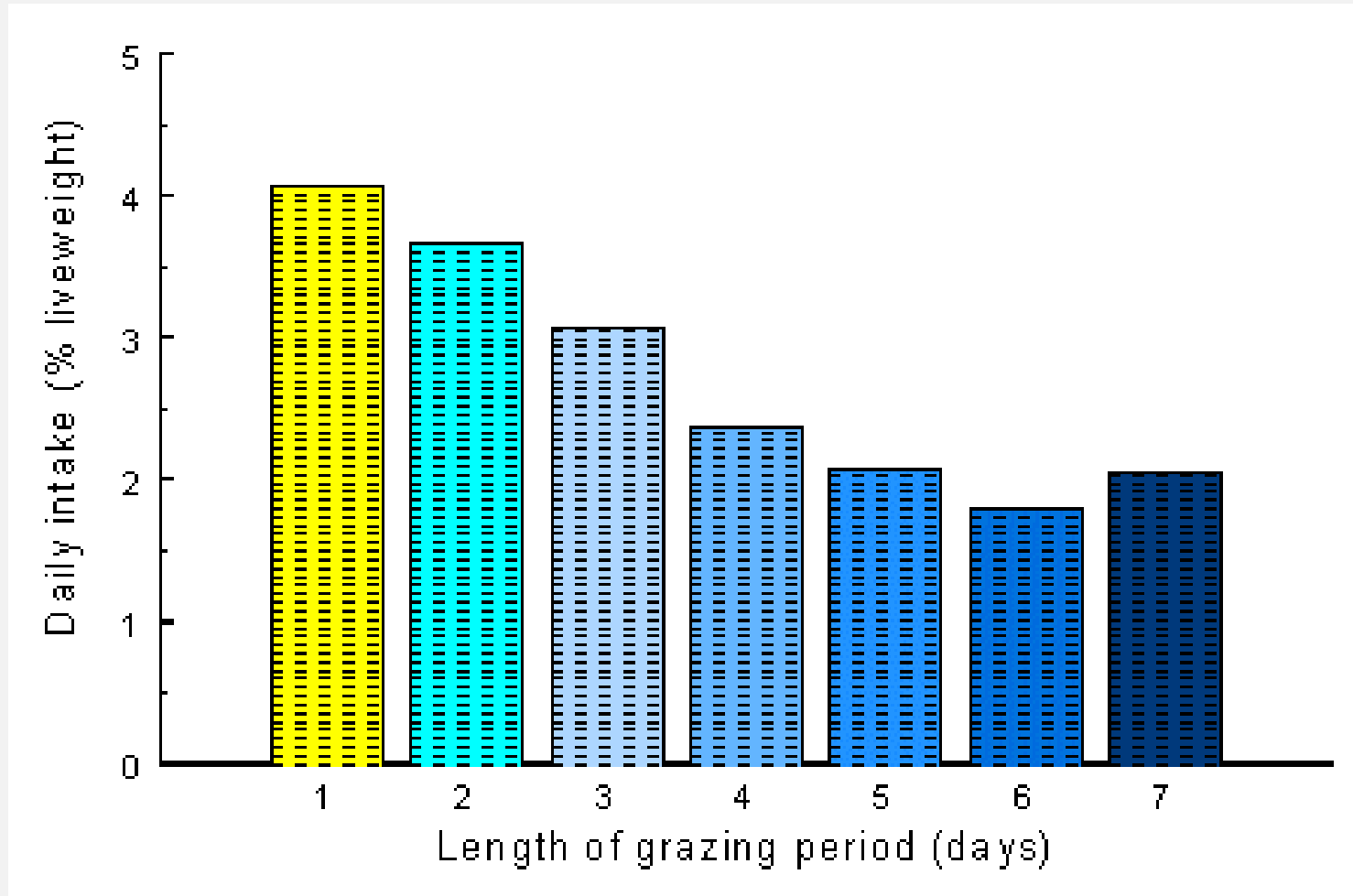
Effect on Carbon Cycle with Livestock



Effect of Grazing on Nitrogen Cycle

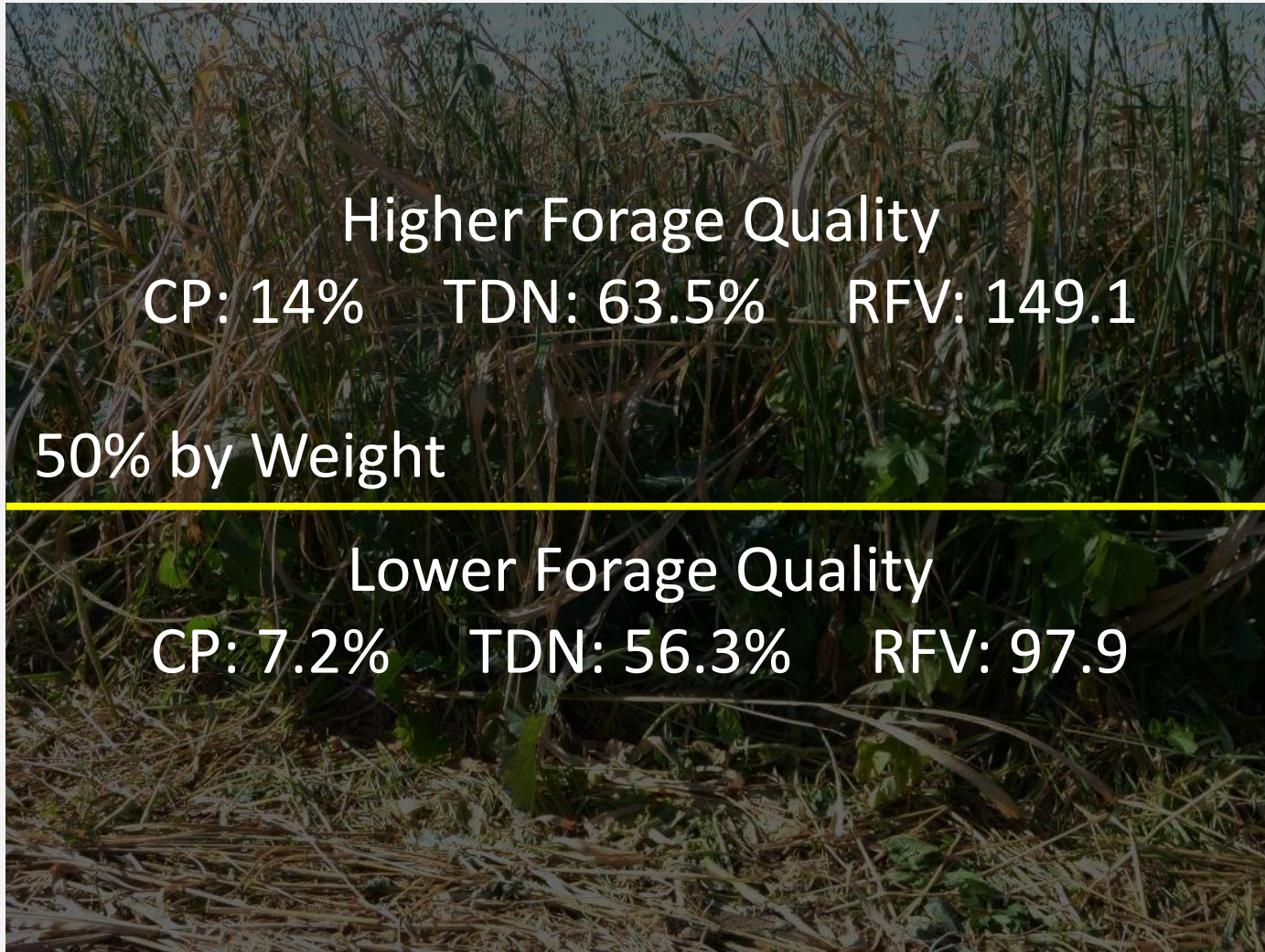


Effect of Graze Period on Animal Performance



University of Missouri Forage Systems Research Center

Forage Quality Declines as Livestock Graze Closer to the Soil



Knowledge check – poll question



On perennial grasses, what percentage of leaf area can be removed without affecting root growth?

Grazing System Objectives

- Grazing is a tool that can....
 - Improve the resource
 - Degrade the resource
- Grazing System Objective:
 - Provide adequate nutrition
 - Protect and feed soil: feed above/below-ground herd
 - Work within manager's labor; social constraints
- Fast track to soil health → mimic nature as closely as possible



Echo-Y, Inc.

Natural Disturbances Stimulating Major Ecological Change

- Tornados
- Hurricanes
- Earthquakes
- Volcanos
- Lightning strikes
- Wildfires
- Insects
- Large herd of herbivores on migration

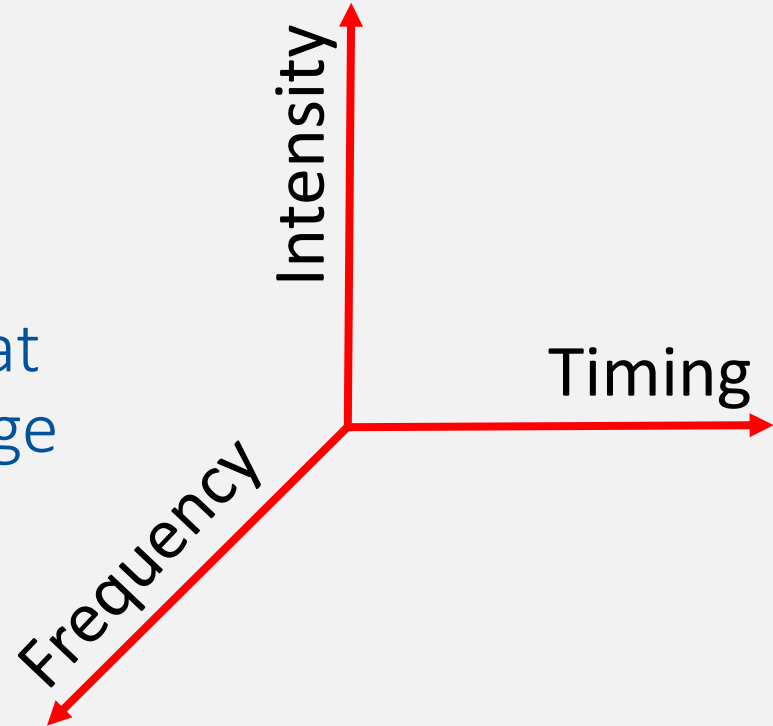


Dimensions of Disturbance

- Timing
- Frequency
- Intensity

Natural disturbance patterns that stimulate major ecological change generally exhibit:

- Variable timing
- Low frequency
- High intensity



Characteristics of Acute Disturbance Related to Grazing

Mimics natural disturbance patterns under changing environmental conditions

Timing: *variable* → plants grazed at different times of year to facilitate pasture diversity

Frequency: *low* → plants grazed few times per year for total plant recovery of desirable plants



Vermont Pasture Network

Acute Disturbance (cont.)



Intensity: high → most plants grazed light to moderately to enhance root biomass; high degree of trampling to protect soil surface, feed soil life; short grazing duration* to prevent re-grazing of desirable plants

*Depending on forage growth rate, resource concerns, time constraints, and objectives

Chronic Disturbance (aka Continuous Season-long or Seasonal Grazing)

Biological disturbance resulting in poor soil health

Timing: unchanging → plants grazed at same time of year every year

Frequency: high → same plants grazed every 7 – 9 days



Kevin Ogles, USDA-NRCS

Continuous Grazing

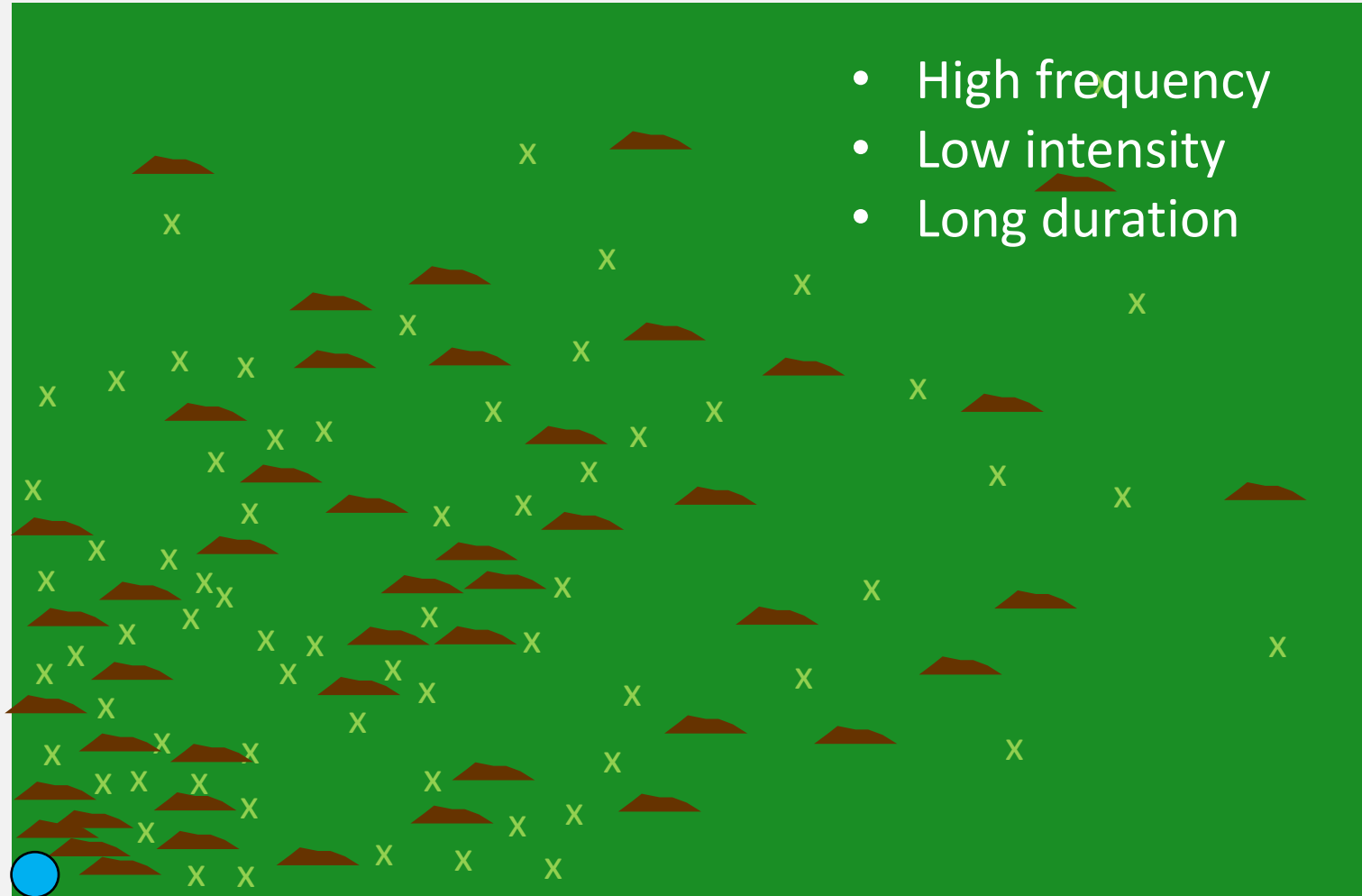


Kevin Ogles, USDA-NRCS

Intensity: low → all plants grazed down very short or plants grazed very short with ungrazed plants in same field/paddock; long graze periods

Requires little to no management skill

Continuous Grazing



- High frequency
- Low intensity
- Long duration

Justin Morris, USDA-NRCS

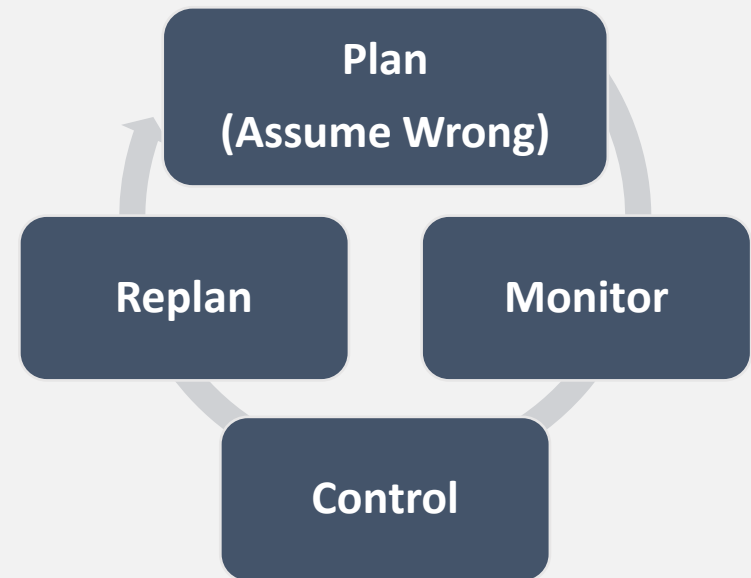
Continuous Grazing



Adaptive Grazing Management

- Uses feedback from system to adapt management to fit ecosystem
- Flexible
- Not a specific grazing system
- Realizes benefits of hands-on management:
 - Livestock comfortable with humans (better herd health)
 - Power of observance – see changes as they happen
 - Minimizes risk associated with unforeseen changes

Feedback Loop



Grazing Management Strategies for Soil Health

- Sufficient quantity and quality of forage
- Reduce selectivity – decrease impact on desirable plants
- Takes leaves to make leaves
- Adequate recovery period for plant health
- Plan and control grazing timing, frequency and intensity
- Change season of use from year to year



Growth Potential with
Sufficient Recovery

Stan Boltz, USDA-NRCS

Knowledge Check

What are three major characteristics of Adaptive Grazing Management?

- 1) Uses feedback to adapt management to fit ecosystem
- 2) Flexible
- 3) Emphasizes hands-on management



Carolyn Wong, USDA-NRCS

Haying

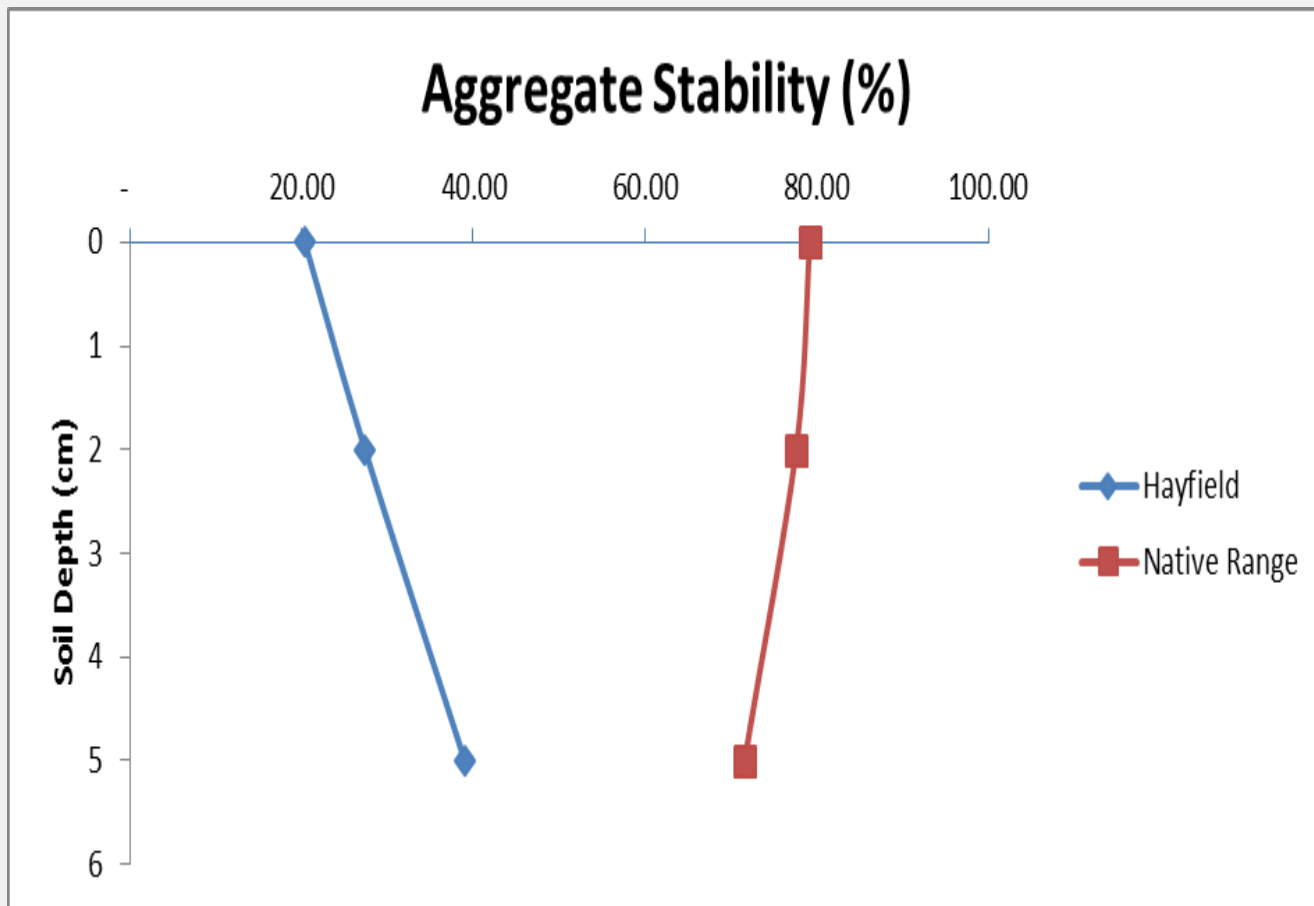
Another disturbance that can result in poor soil health



Midwest Machinery Company

Effect of Haying on Aggregate Stability

Mellette County, SD

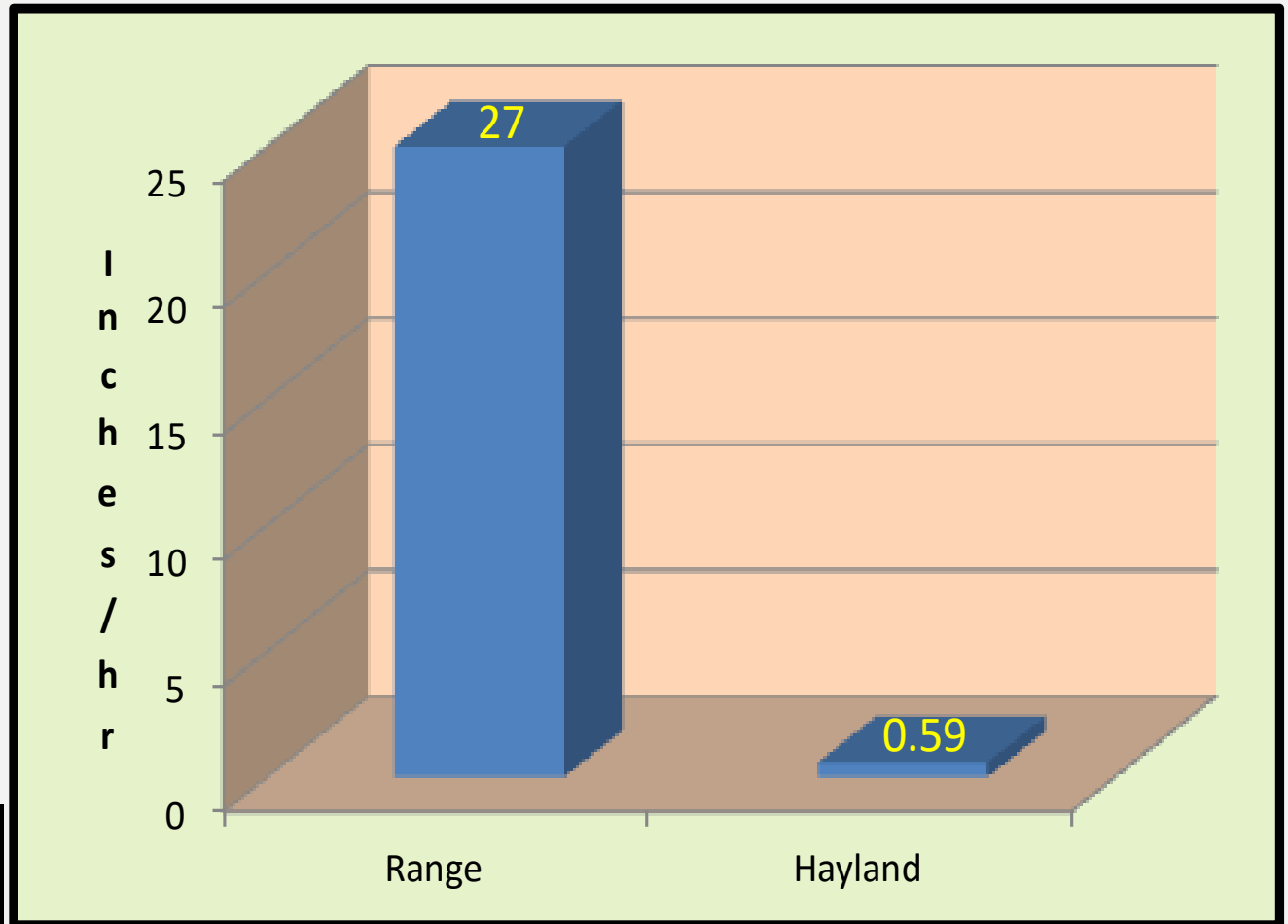


Effect of Continuous Haying on Water Infiltration Rate Mellette County, SD



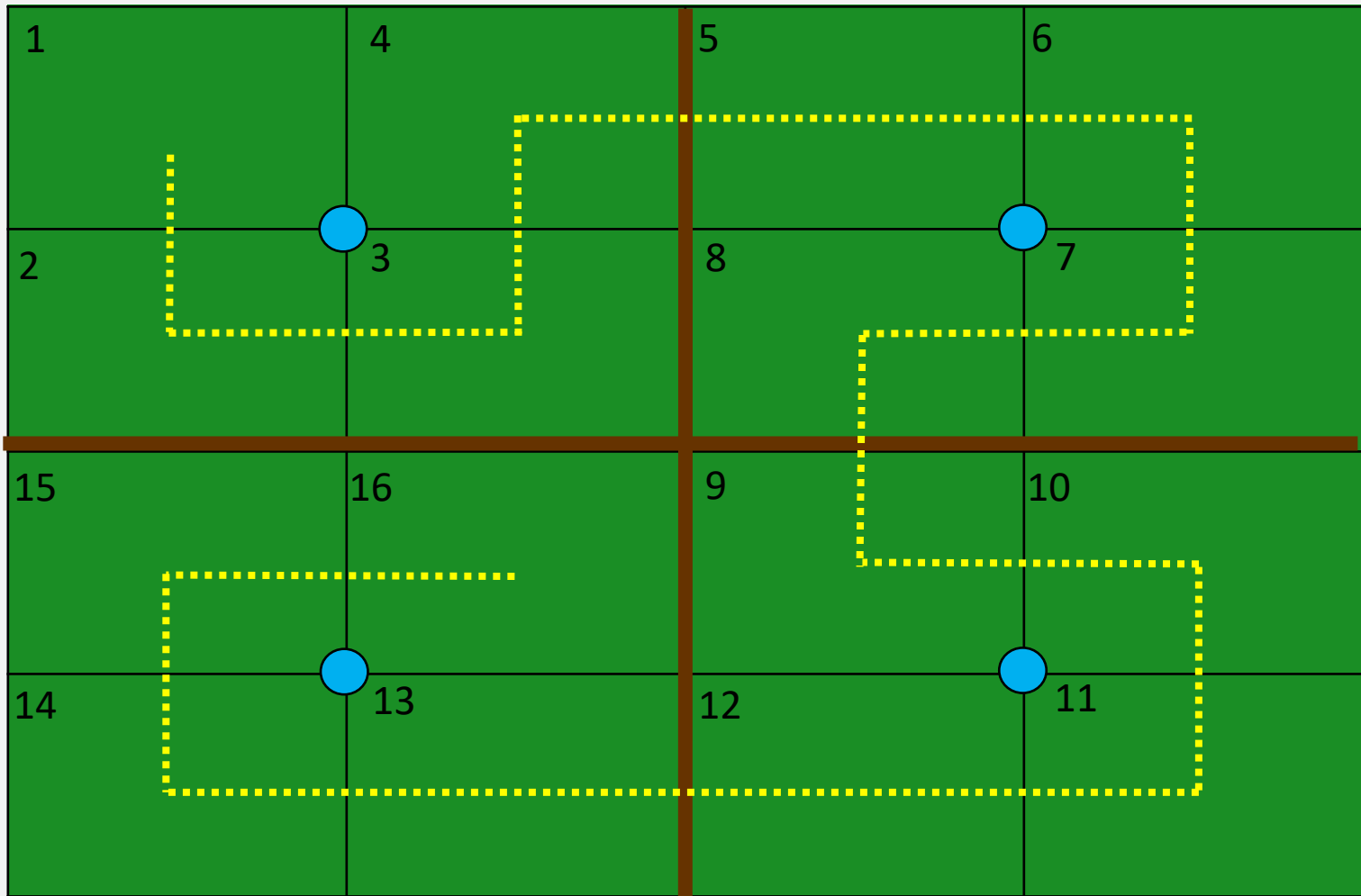
Rotational
Grazing

Hayland



Management Strategies for Grazing Grassland

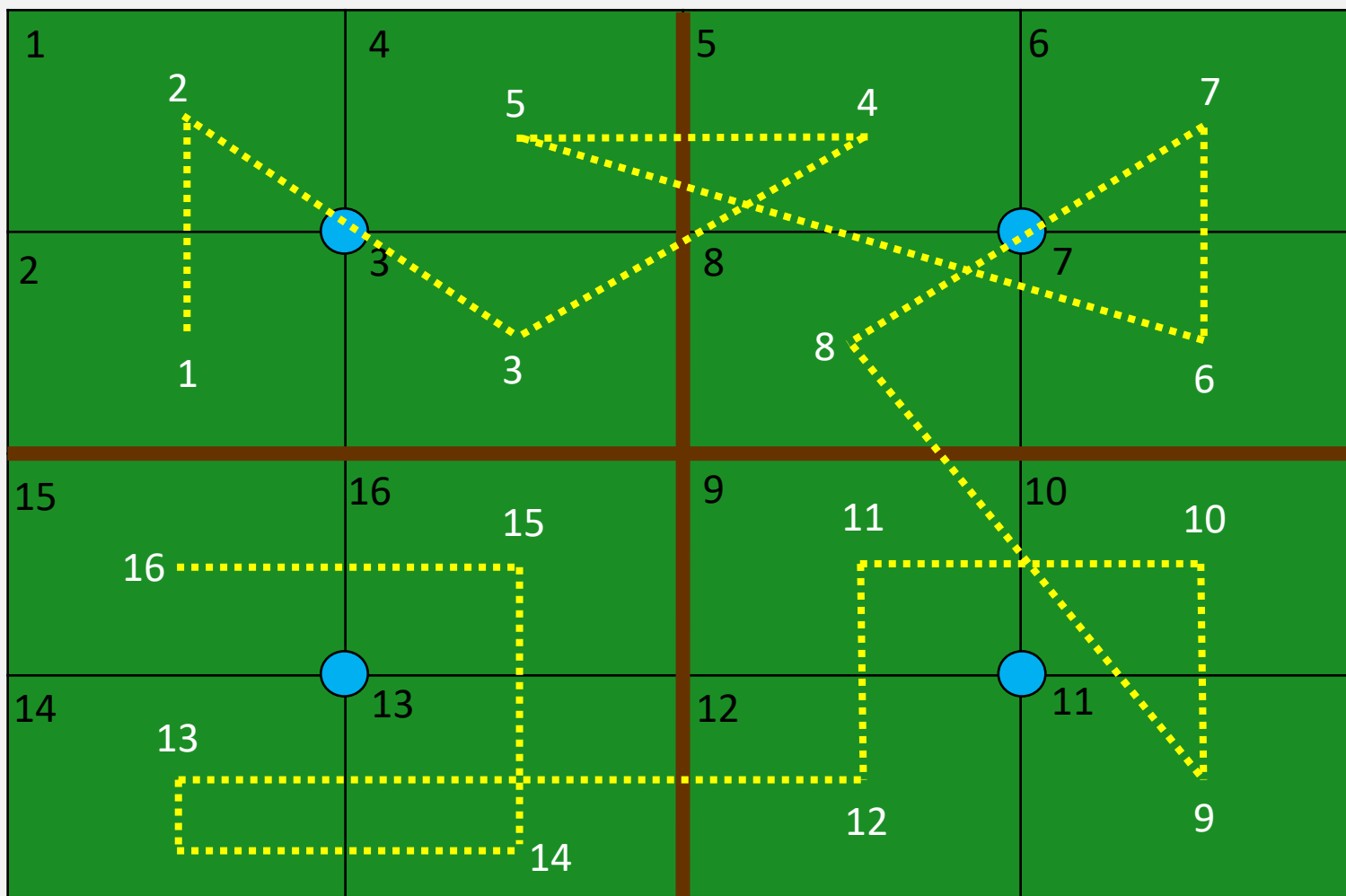
Sequential Grazing Rotation (usually by the calendar)



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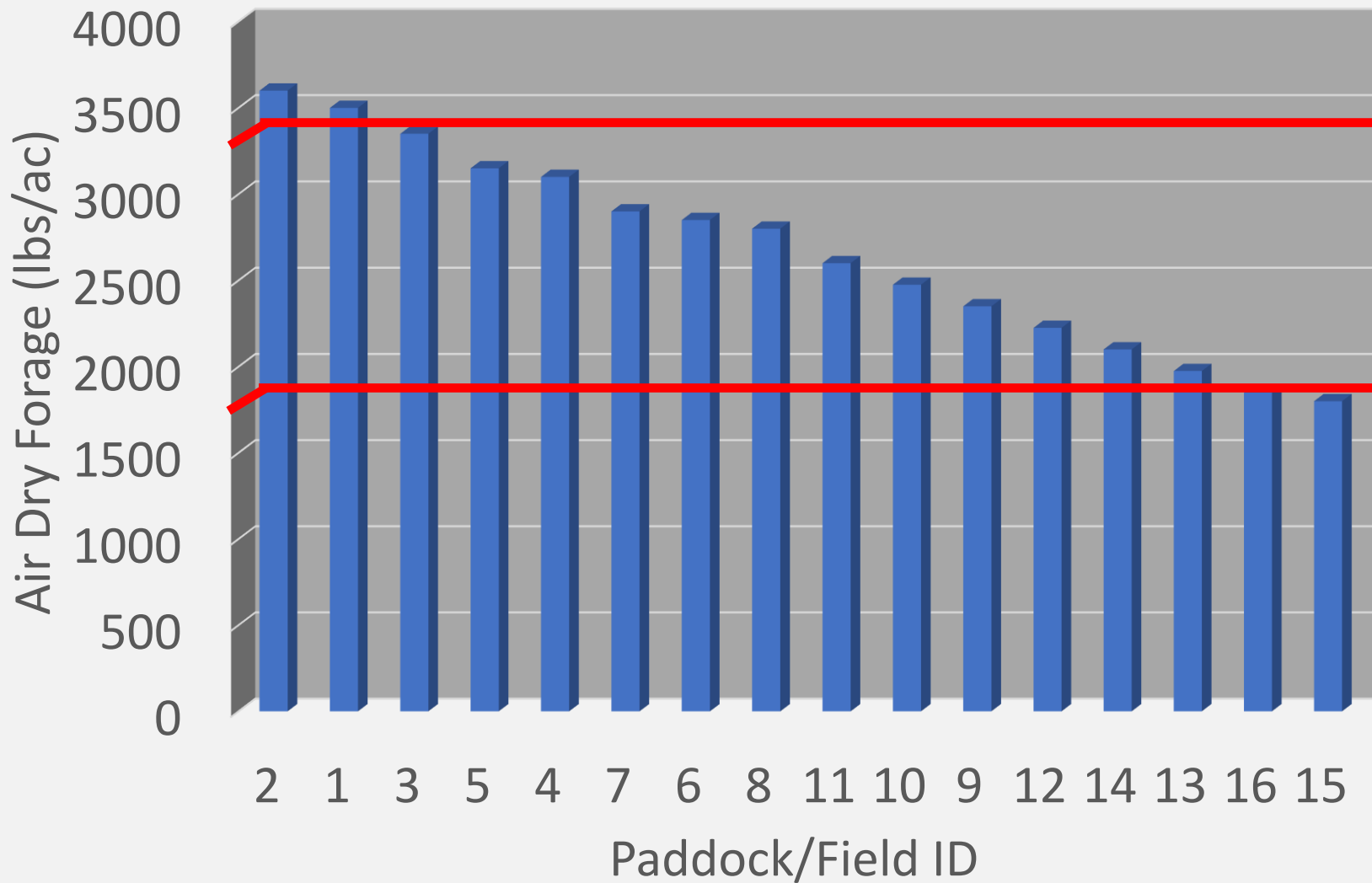
Management Strategies for Grazing Grassland

Rotation Based on Pasture Readiness

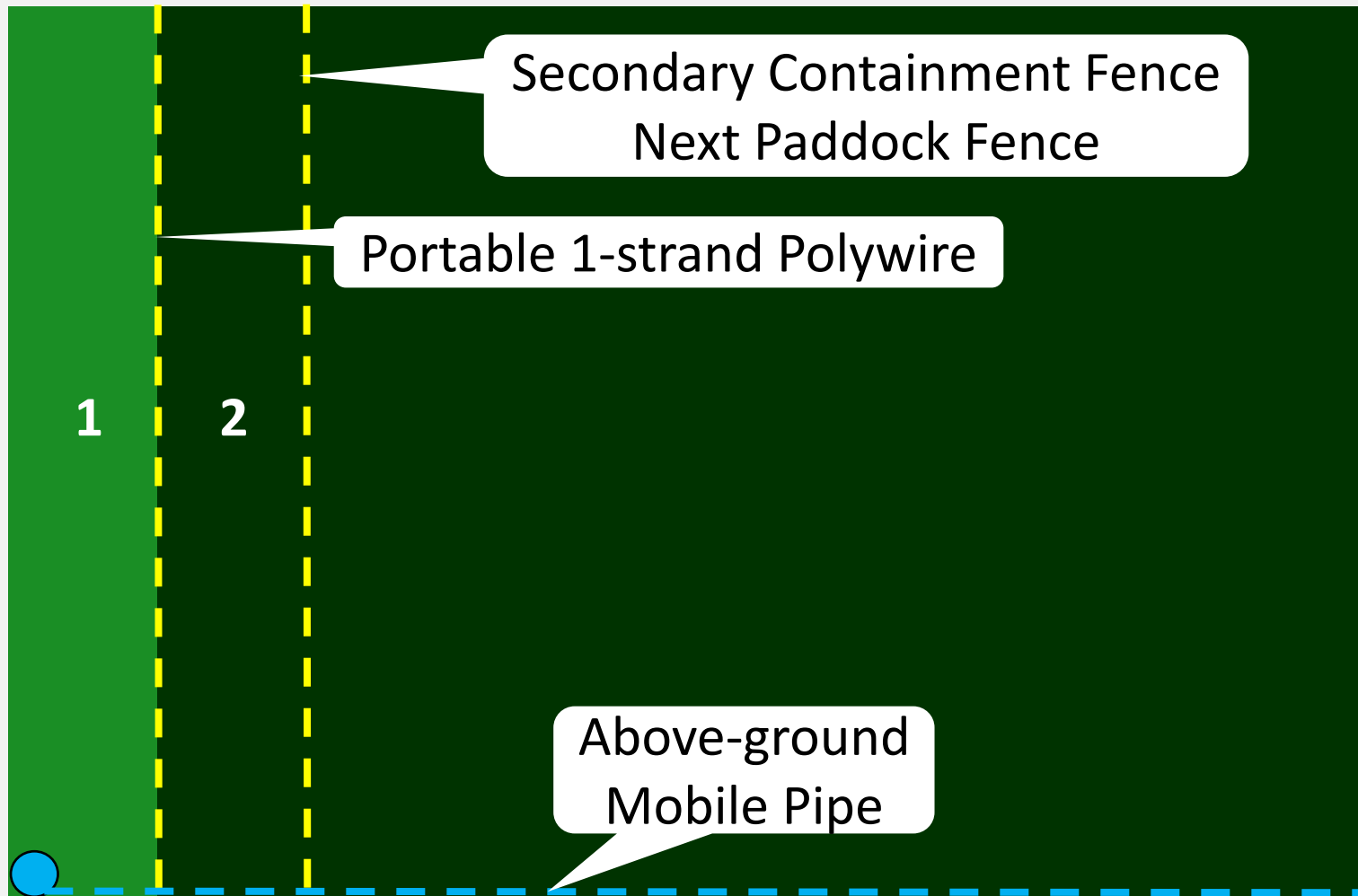


Justin Morris, USDA-NRCS

Grazing Wedge

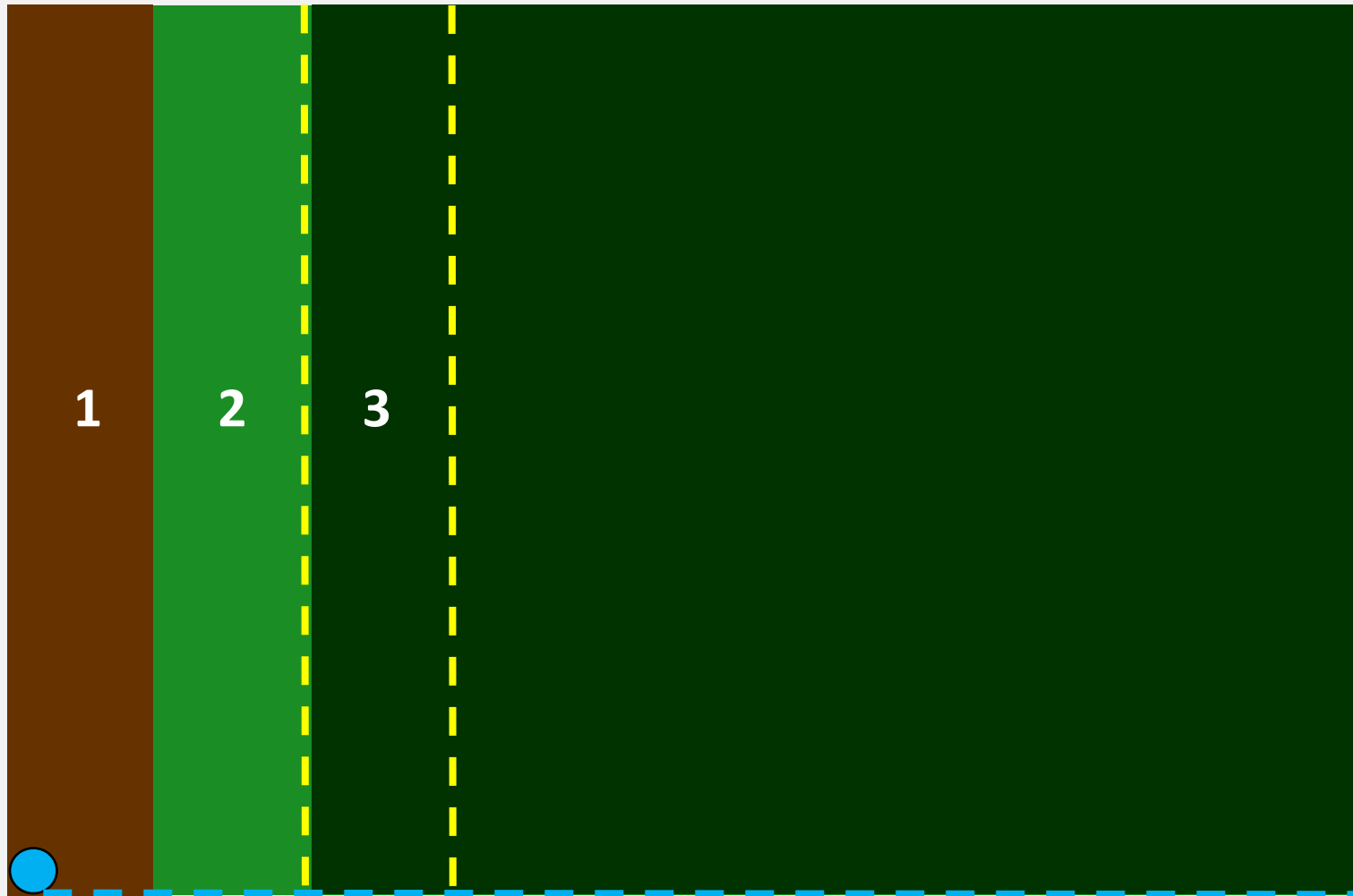


Management Strategies for Grazing Cropland and Grassland



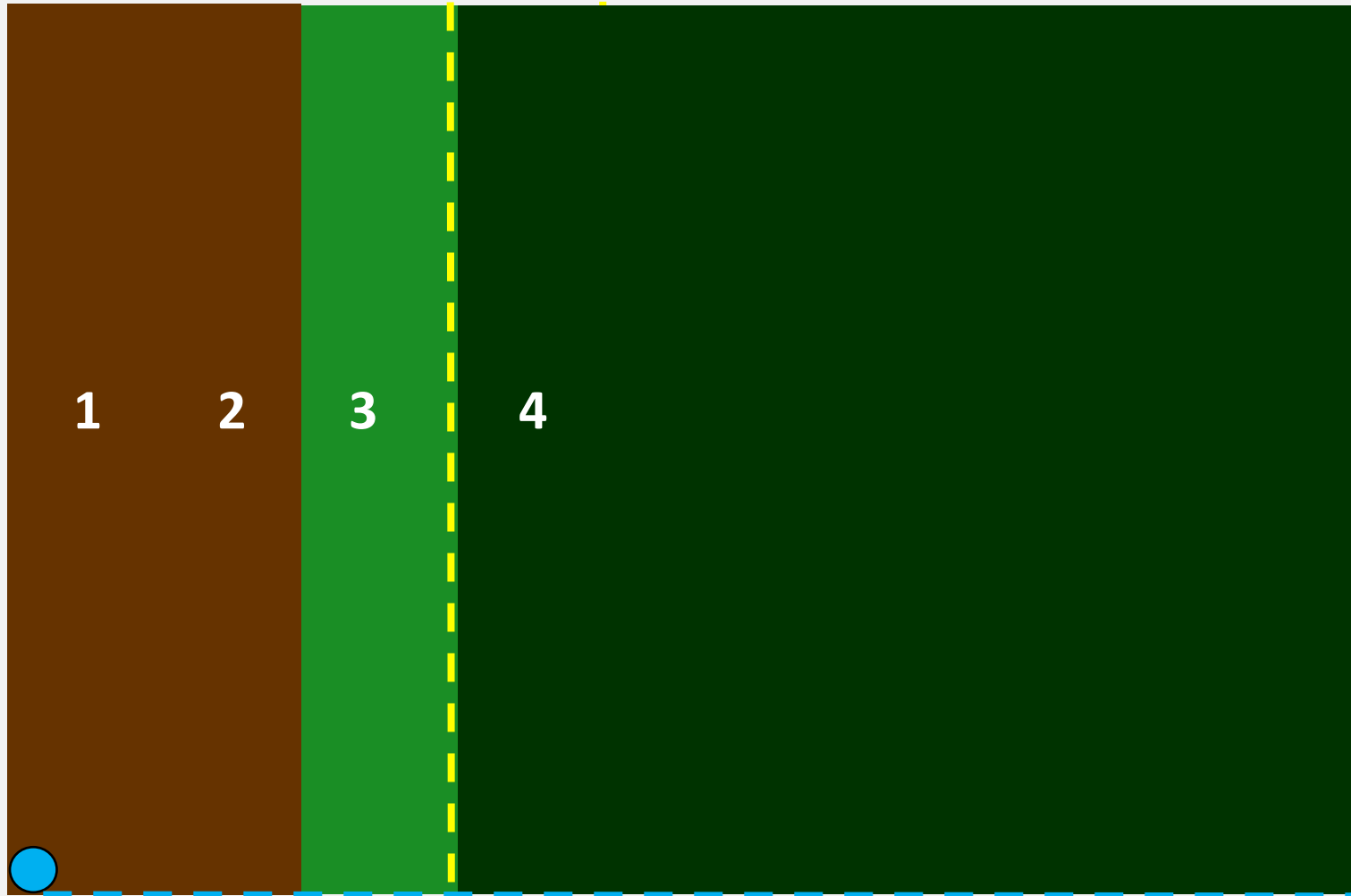
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Management Strategies for Grazing Cropland and Grassland



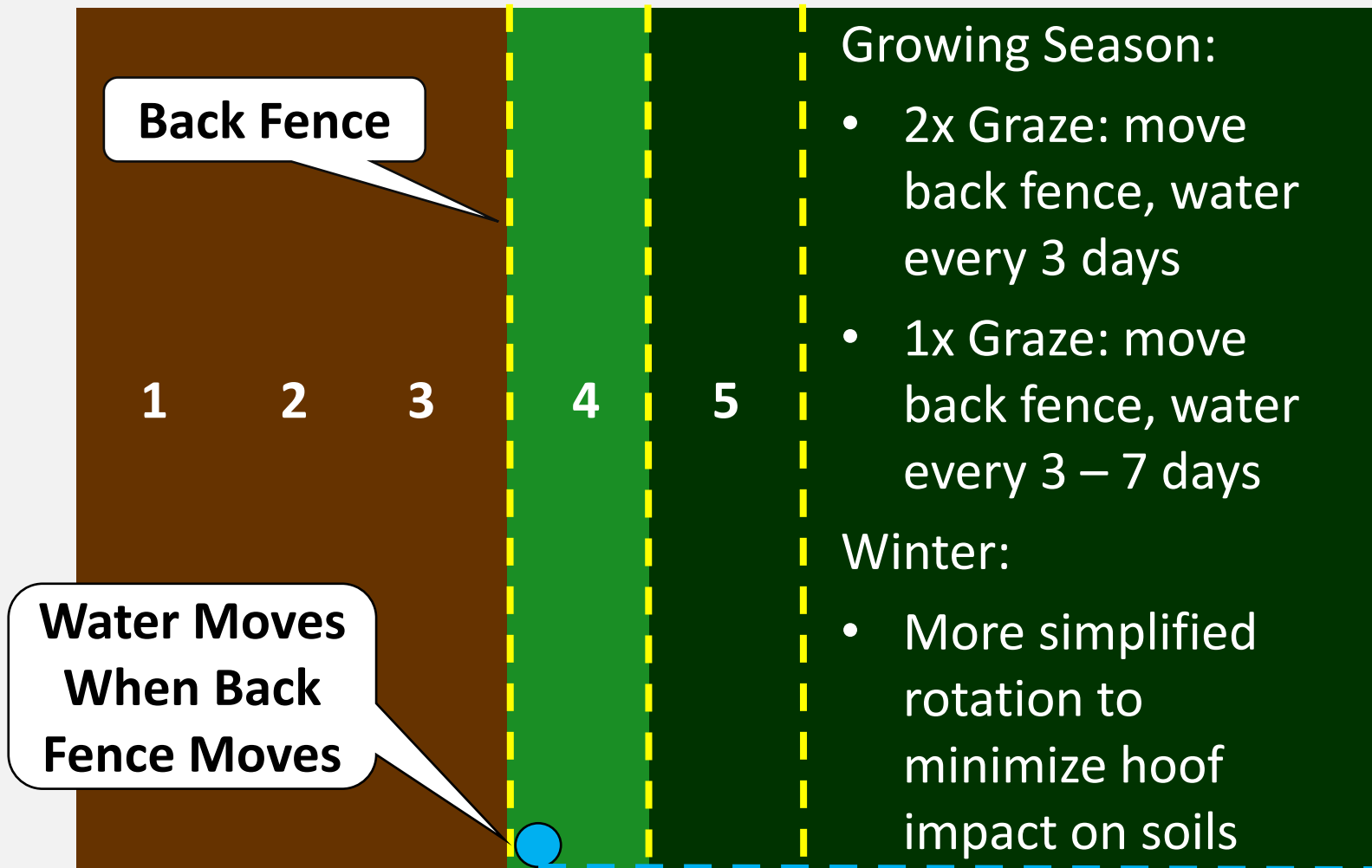
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Management Strategies for Grazing Cropland and Grassland



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Management Strategies for Grazing Cropland and Grassland



Justin Morris, USDA-NRCS

Other Soil Health Improvement Strategies

Bale Grazing



Saskatchewan Agriculture



Saskatchewan Agriculture

Portable Fencing Equipment



Doug Peterson, USDA-NRCS



Doug Peterson, USDA-NRCS



Gallagher



Powerflex Fence



Novel Ways, Ltd.

Water: Portable Water Troughs



Rubbermaid



K-Line North America



Judge Jessop

More to Ruminant On

How does continuous haying affect soil health?



- Reduction in aggregate stability
- Reduction in soil carbon

Midwest Machinery Company

Cover Crop Selection

- Mixtures typically provide considerably higher production and quality versus single species plantings
- Grass dominated mixes are usually more desirable for grazing purposes
- Warm-season mixes: somewhat lower in protein, but higher yielding
- Cool-season mixes: higher in protein and lower yielding



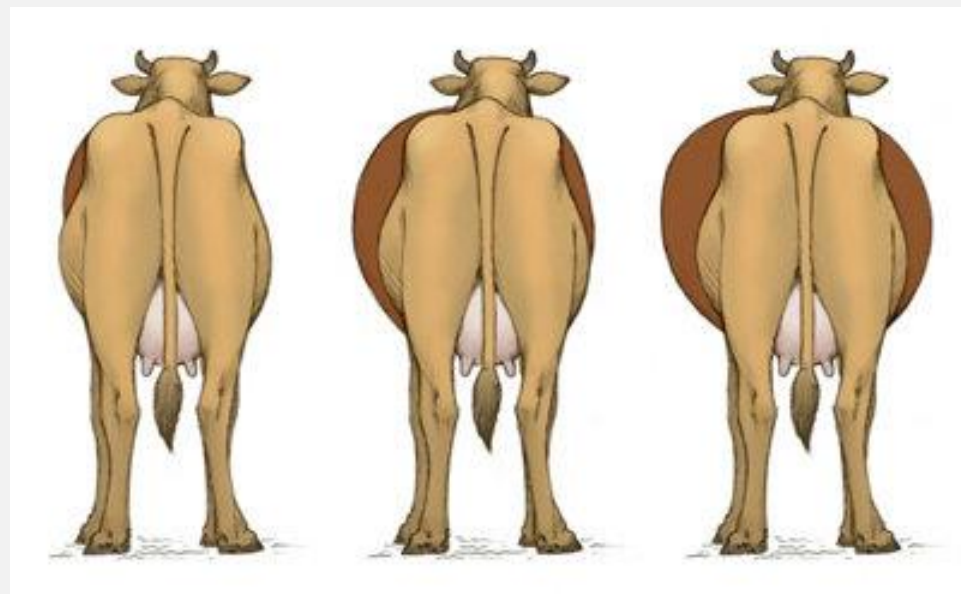
Cisco Farm Seed

Herbicide Residual Considerations

Follow the label

Methods to Avoid issues with High Quality Forage

- Do not introduce hungry animals into a field
- Introduce animals slowly or restrict access over 7 – 10 day period
- Provide dry matter (hay, millet hulls, dry pasture, or crop stalks) when grazing high quality cover crops



Tractor Supply Co.

Knowledge Check

Where is the highest quality forage on a plant?

- a) lower leaves
- b) middle leaves
- c) upper leaves
- d) forage quality is the same throughout

Grazing in the 21st century will require.....

- Optimize disturbance
- Optimize soil cover
- Maximize biodiversity
- Maximize living roots



Carolyn Wong, USDA-NRCS



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