

Upper Midwest Grazing Educators Webinar Series

Green Lands Blue Waters



Teaching the Basics of Grazing
May 15, 2015

Hosted by Warren King and Jane Jewett



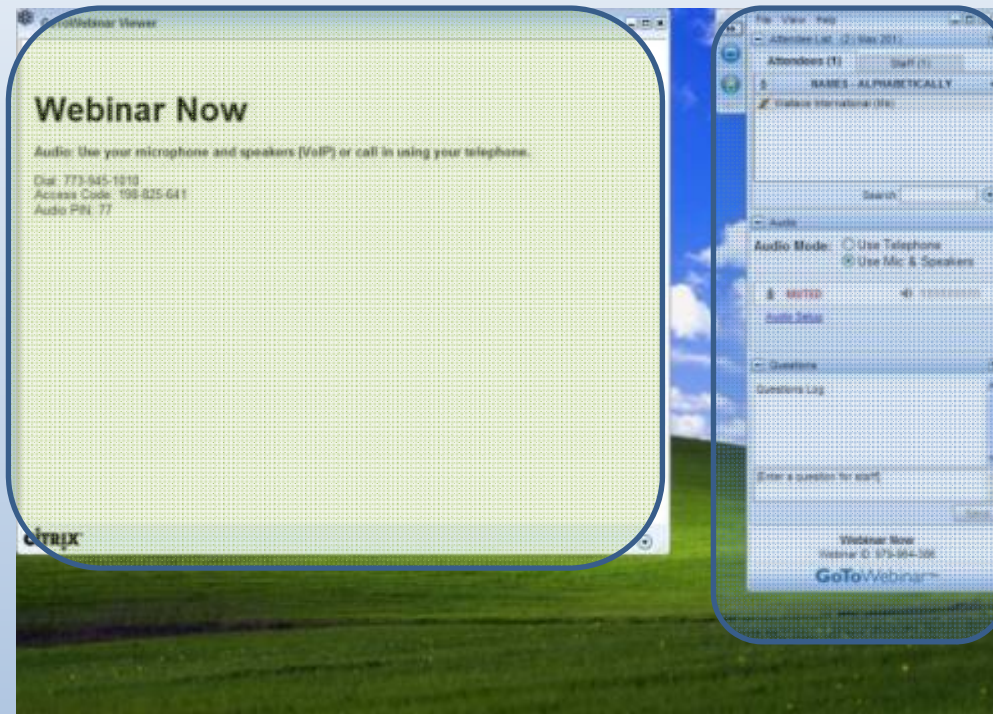
- Co-manager of the Pasture Project
- President of WellSpring, Ltd
- Work focused on expanding environmentally sustainable farming, developing local & regional food systems and improving water quality



- Research Fellow, University of Minnesota
- Green Lands Blue Waters Initiative

Webinar Technical Orientation

Your Starting Screen

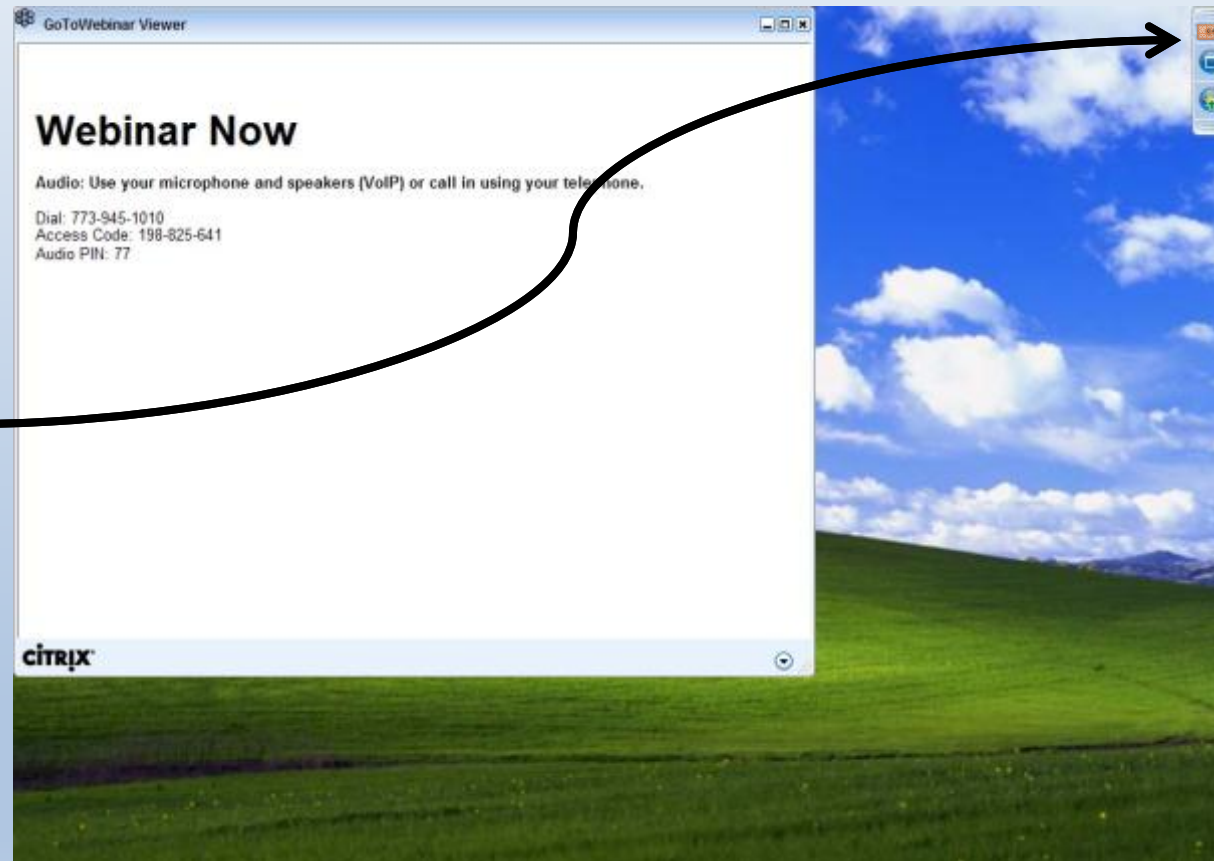


Presentation

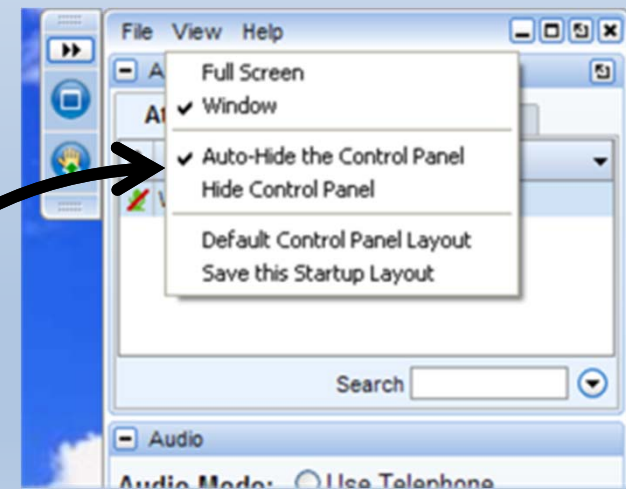
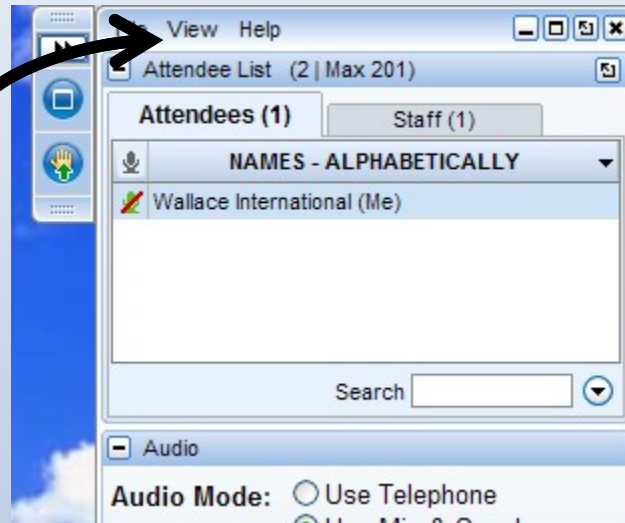
Control Panel

To Display Minimized Control Panel

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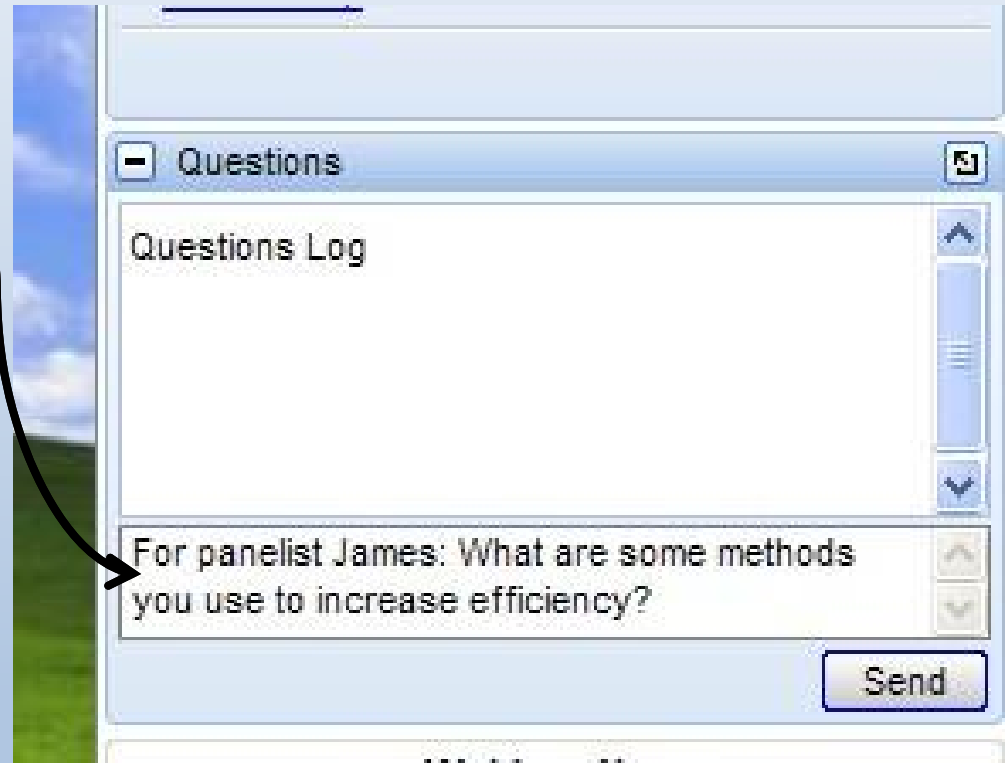


To Ask a Question

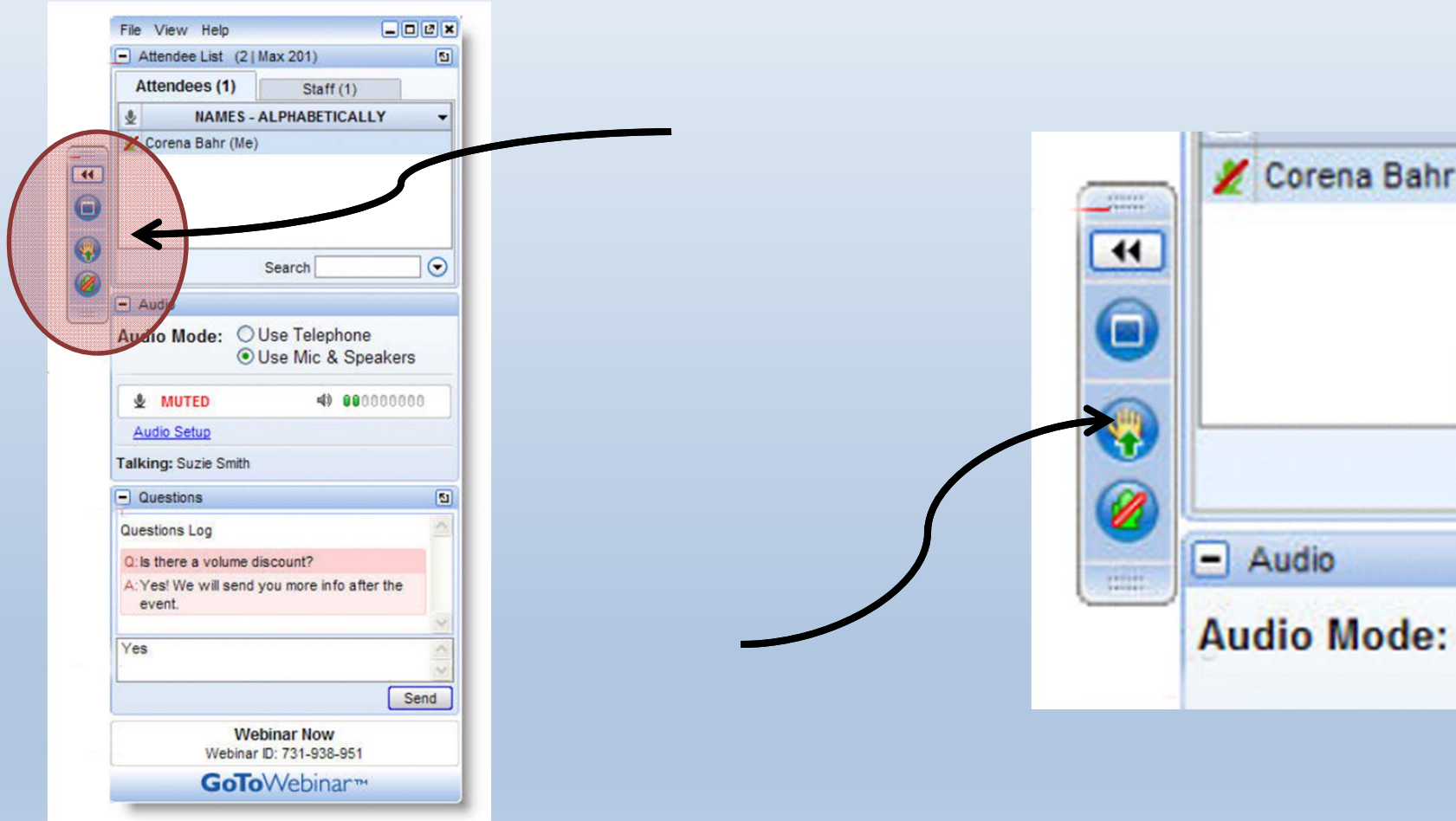
Type your question in the small box at the bottom of the Questions box.

If possible, specify which panelist(s) you are addressing with your question.

Press "Send"!



To “Raise Your Hand”



Post-Webinar Survey

- We will be sending out a survey following the webinar.
- These surveys help to make for a better experience for everyone involved, if you could please take a moment to fill them out, it would be of great help to us.



Who's Sponsoring the webinar series?

Green Lands Blue Waters

Goals

- Increase perennial forage and pasture
- Improve environmental performance of farming
- Maintain production and profitability

The Pasture Project

Goals

- Expand grass-based livestock production
- Accelerate transition to sustainable farm production
- Improve water quality

Why Focus on Grazing Educators?

- The Upper Midwest is a unique geography
- More young farmers are interested in livestock production
- More landowners and conservationist are interested in livestock benefits
- More consumers want pasture raised meat and dairy products
- Less public funding for grazing networks and education
- Fewer professional development opportunities for educators
- Changes in grazing techniques and terminology
- No single source for education materials

What Could a Grazing Educator Network Achieve?

- Connect Upper Midwest Educators through discussion and sharing
- Assess education materials-tool; determine what's missing and fill the gaps
- Create a platform to house and access materials and tools
- Share what works and why
- Cross-pollination of staff, students, apprentices and programs
- Involve established grazing education programs
- Access materials-tools no longer in circulation
- Build collaboration that is more “grass-roots” than “top-down”
- Include educators of various types; farmers, academics, agency and consultants
- Establish basic principles of managed grazing that are taught by all

What is the format for today's webinar?

- **Presenters will discuss topics, sharing experience and insights**
- **Audience is encouraged to do the same**
- **Moderators will “direct the traffic” and keep discussion moving**
- **Audience is asked to take a brief survey at the end of the webinar**

Rhonda Gildersleeve



- UW Extension Grazing Specialist Rhonda Gildersleeve has worked with agricultural producers in California and Wisconsin on profitable and environmentally sound grazing-based production systems for beef, sheep, and dairy cattle.
- A native of Grant County, Wisconsin, Rhonda received a B.S. Agriculture in production agronomy from UW-River Falls, and also holds M.S. (University of Florida) and Ph.D. (Texas A&M University) degrees with emphasis on management of pasture and rangeland ecosystems.
- In her spare time, Rhonda manages her own organic dairy farm near Boscobel, WI.

Use Livestock Husbandry Skills to Monitor the Grazing Animal

We have several tools available to monitor animal performance on pasture:

- Production parameters: milk production, livestock weight gains, reproduction success, etc.
- Body condition scores
- Animal behaviors
- Manure consistency



Grazing Animal Basics That We Need to Know

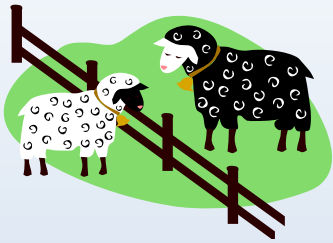
- Definitions
- Diet preferences
- Digestive physiology
- Nutrient needs of grazing livestock
- Dry matter intake (DMI) factors
- Relationships with pasture management



Definitions

- Grazing animals co-evolved with their natural diets and developed digestive systems to optimize their food resources
- **Herbivores:** plant-based diets
- **Ruminants:** type of herbivore that has a 4 compartment stomach designed for “batch-processing” forages (cattle, sheep, goats)
- **Some herbivores are not ruminants** (swine, horses)



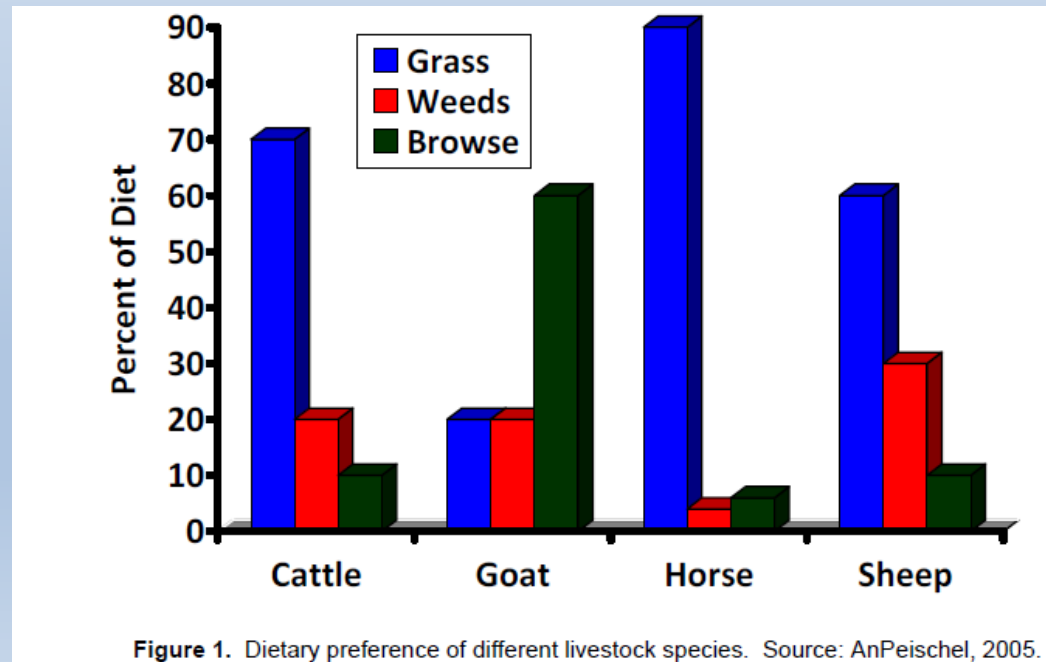


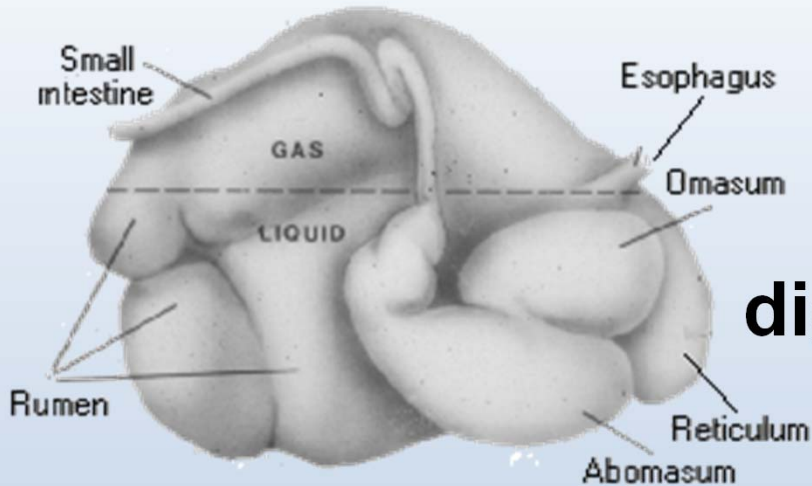
Herbivore Diet Preferences:

Grazers: primarily grasses (< 25% browse)

Browsers: primarily woody plant foliage, shrub/forb stems and leaves (<25% grasses)

Intermediates: switch hitters who adjust to available food supply





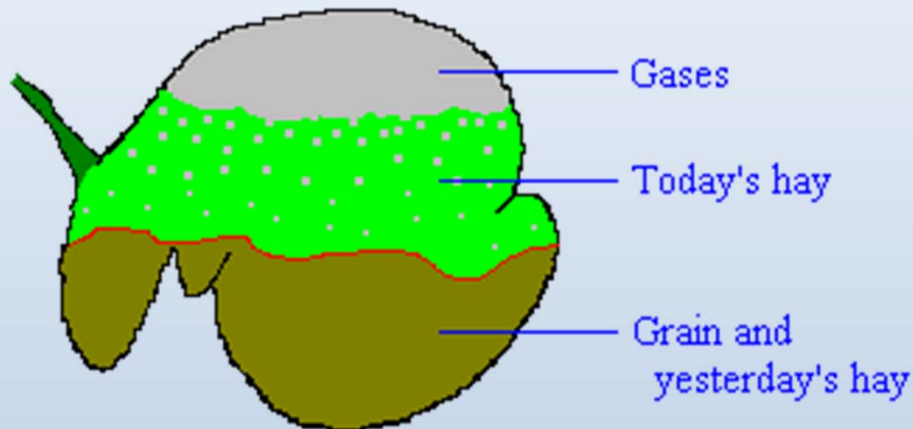
Ruminant:

Any hoofed animal that digests its food in two stages



- Ruminants evolved to consume cellulose-based roughages
- Consume forages rapidly and complete chewing process later
- Digestive system includes a fermentation process by microbes that converts fiber to useable nutrients

Ruminant Physiology



**Think of rumen as a fermentation vat
“on the hoof”**

- Microbes use fermentation process to break down complex carbohydrates (CHOs) such as cellulose to glucose, then convert to volatile fatty acids (VFAs)
- Higher fiber in diet stimulates saliva production, which in turn increases VFA production
- Ruminants get >70% of their energy from VFAs:
 - acetic, proprionic and butyric acids
- Virtually all VFA absorption occurs in rumen

Ruminant Physiology

“When Microbe-Mama Ain’t Happy, Ain’t Nobody Happy”

- Ideal environment: 100 - 108°F; pH = 6.0 – 6.4
- Diet must meet the needs of **both** livestock and rumen bugs for energy & protein
- **Pastures are a good protein source for rumen microbes**
- Microbes themselves are the major protein source for ruminants once digested and absorbed in abomasum and small intestine.
- **Overfeeding energy results in a swift drop in pH, shifting rumen microbial populations, results in acidosis if rumen pH drops far below 6.2, shutting down fiber digestion**



Nutrients Needed by Grazing Animals:

Water:

Species	Gallons /day
Beef cattle	6 - 18
Dairy cattle	10 - 30
Sheep, goats	1 - 4
Horses	8 - 12

Salt & Minerals:



Crude Protein:

Content and digestibility of protein is generally adequate to **high** in managed pasture systems, but need adequate energy to utilize

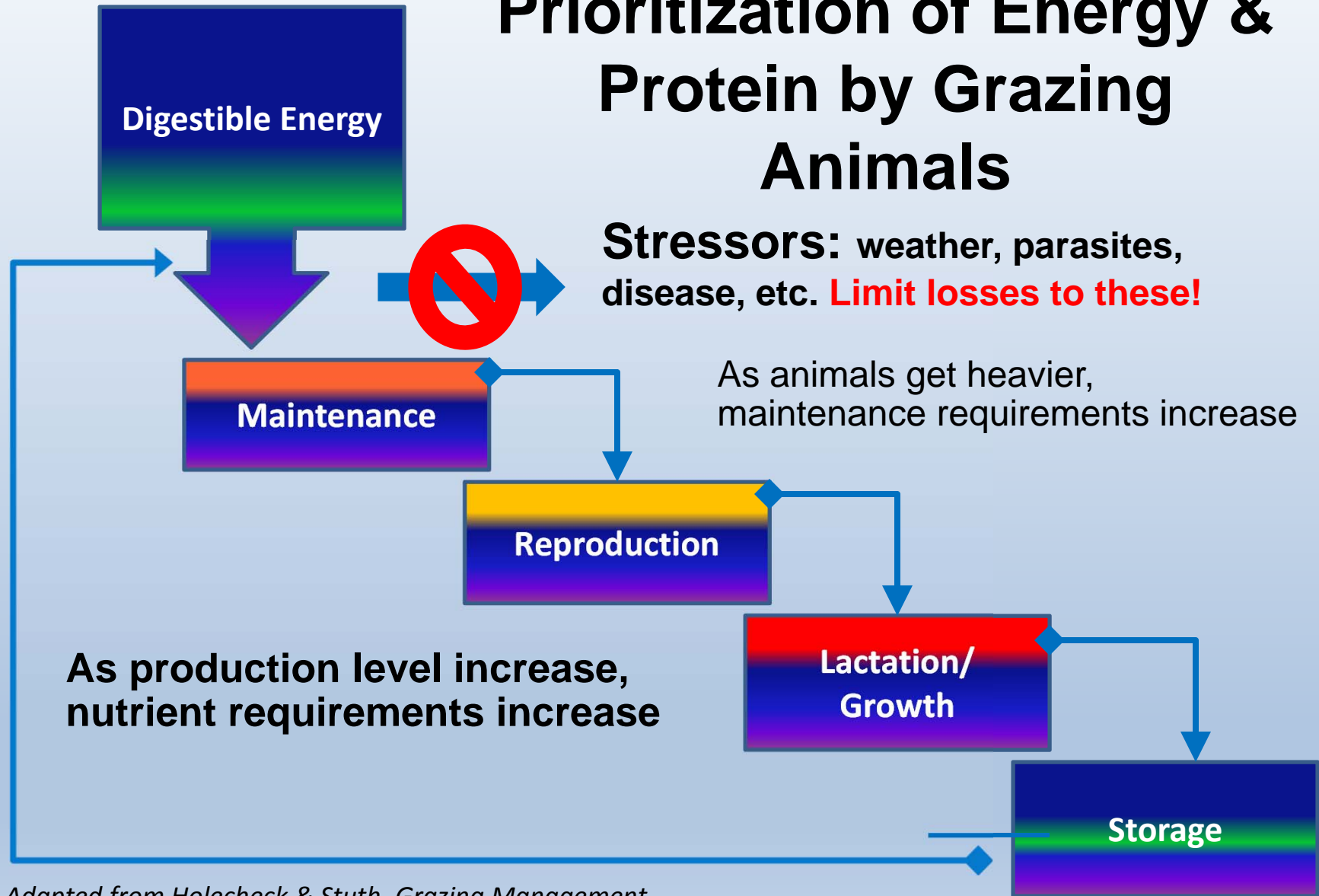
Energy:

In pastures, **CHOs are the primary energy source:**

- **Non-structural CHOs:** soluble sugars and starches: readily digested energy
- **Structural CHOs (fiber):** cellulose, hemicellulose, lignin
 - Lignin is basically 100% indigestible, even by the rumen microbes
 - More mature plants = higher lignin content = lower digestibility

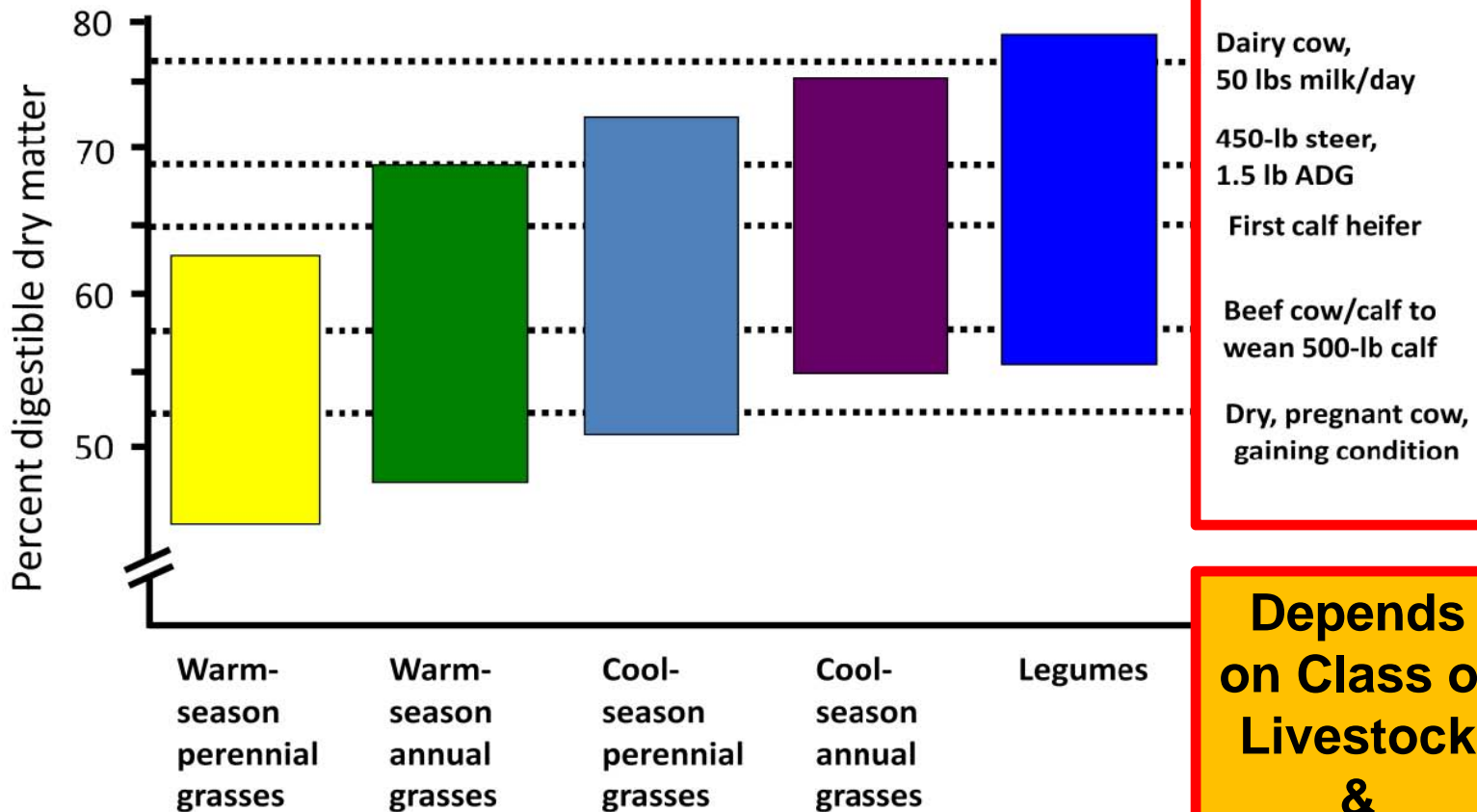
Prioritization of Energy & Protein by Grazing Animals

Stressors: weather, parasites, disease, etc. **Limit losses to these!**



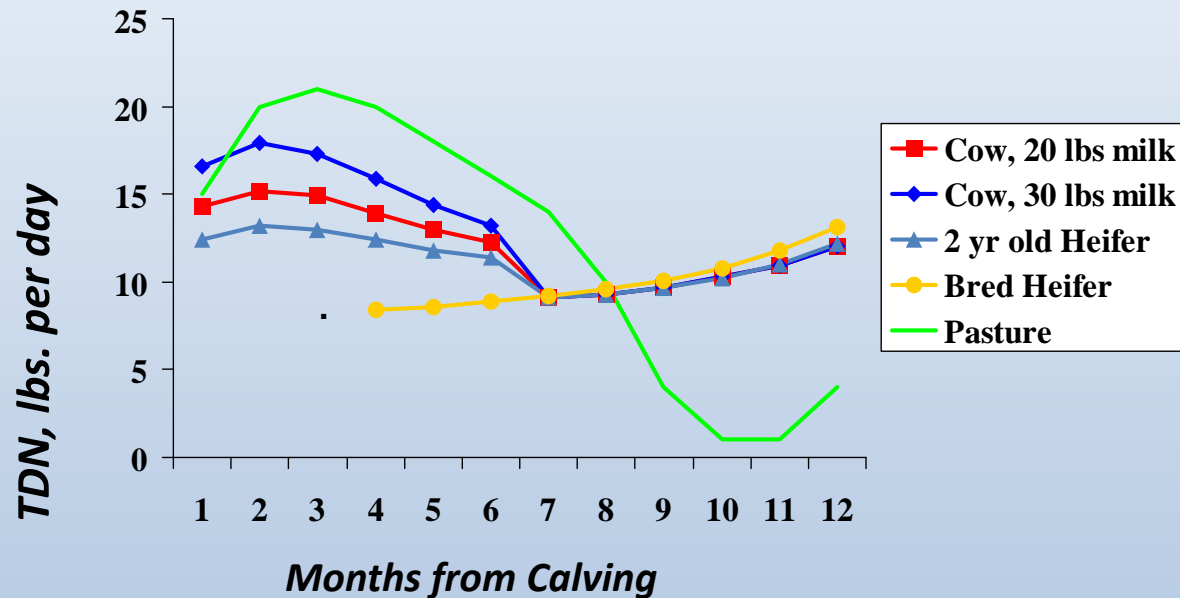
Adapted from Holecheck & Stuth, Grazing Management

What is Our Goal?



Adapted from: H. Lippke and M.E. Riewe. 1976. Texas Agric. Exp. Stn. Res. Monograph RMGC:169-206.

Beef Cow Cycle and Nutrient Demands



- Nutrient demands change dramatically during annual livestock production cycle
- MATCH livestock nutrient demands with pasture production and quality cycles

Dry Matter Intake

What Grazing Animals Eat Is a Function of:

- **Time Spent Grazing** range is 4 - 10 hours
 - Limited forage: need to graze for longer periods
 - Ruminants need almost equal amounts of time for grazing, rumination and rest
- **Biting Rate: how fast?** range is 30 - 80 bites/minute (cattle)
- **Bite Size**
 - how much an animal can consume in one bite
 - **Only intake factor we can control with grazing management!**
- **Our Goal:**
 - Maximize bite size of high quality forage with few bites per plant to balance plant/animal needs

Pasture Dry Matter Intake Factors:

- **Palatability:** how acceptable the forage “tastes” to the grazing animal
- **Nutritive value:** amount of nutrients provided and how digestible they are
- **Availability:** how much forage is offered
- Our Goal: **Maximize Pasture Dry Matter Intake** to optimize animal performance



What is “Good” Dry Matter Intake (Cattle)?

Intake as a Percent of Live Weight	Expected Gains, pounds
2.0%	1.0
2.5%	1.5
3.0%	2.0
3.5%	2.5

“More is Better”

Managing Pasture for High DMI?

- Grazing animals will always select the highest quality diet possible **from the pasture forage available to them**
- **Challenges:**
 - Too little forage available — limits dry matter intake
 - Too mature — limits nutritive value of dry matter intake and slows rate of passage



Pastured Livestock Resources:

- NRCS Pasture & Range Handbook: Chapter 6, Livestock Nutrition, Husbandry & Behavior, <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>
- ATTRA: Ruminant Nutrition for Graziers, <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=201>
- Pasture-based Livestock Production, NRAES 187 (4 book series) Plant & Life Sciences Publishing, Cornell University, http://palspublishing.cals.cornell.edu/nra_order.taf?_function=view&ct_id=24
- eXtension: <http://www.extension.org/> and your local/state Extension Service for resources on related grazing & livestock production topics
- Utah State BEHAVE website: <https://extension.usu.edu/behave/> (grazing animal behavior information)

Allen Williams



- Allen Williams is a 6th generation family farmer (since 1840) and founding partner of Grass Fed Beef, LLC and LMC, LLC. He has consulted with more than 3500 farmers and ranchers in the U.S., Canada, Mexico, and South America on operations ranging from a few acres to over 1 million acres.
- Allen pioneered many of the early grass fed protocols and forage finishing techniques and has spent the last 15 years refining those. He is a “recovering academic” and has authored more than 300 scientific and popular press articles.
- He is featured in the Carbon Nation film, “Soil Carbon Cowboys” (<http://vimeo.com/80518559>) and has a recently released book co-authored with Teddy Gentry, “Before You Have A Cow”.
- Allen is a regular contributor to “GRAZE” and has written articles for the “Organic Broadcaster”, “Stockman GrassFarmer”, and many other publications.
- He currently serves on the Board of Directors of the Grass Fed Exchange and the Mississippi Sustainable Agriculture Network, Core Team Member of the Pasture Project, and Co-Investigator for Team SoilCarbon. He also serves as an officer in the Starkville Civitan Club and is active in his local church.

What Are The Goals For Your Farm or Ranch?

- Animal Performance vs. Soil Health
 - Are they antagonistic?
 - Can you achieve both at the same time?
- What “cycle” do you want to be in?
 - Inorganic fertilizer, Lime, Herbicide cycle
 - Well-managed Water, Mineral, Energy Cycle
- Can livestock be used effectively as a land improvement tool?

What Are The Limits to Building Soil Health?

- How rapidly can we build Soil OM?
- How much can we influence soil microbial populations and soil organism populations?
- What influence do these have on forage productivity and quality, water infiltration & quality, and animal performance?

Building Soil OM – How Long Does It Take?

- Mississippi – 1.0% - 4.2% (**4 years**)
- New York – 1.5% - 4.1% (**5 years**)
- Kansas – 1.6% - 3.9% (**5 years**)
- Nebraska – 2.1% - 5.5% (**6 years**)
- Michigan – 2.2% - 6.1% (**6 years**)
- Wisconsin – 2.3% - 5.0% (**4 years**)
- North Dakota – 1.6% - 11.0+% (**12 years**)

Soil Carbon Data – Total Soil Carbon

Horizon	AHSD	CG - Good	CG - Poor
1	4.67	1.64	1.36
2	4.00	1.88	1.37
3	2.95	1.03	0.40
4	2.04	1.02	0.54
5	1.71	0.38	0.40
6	1.42	0.41	0.34

Soil Carbon Data – Soil Organic Matter

Horizon	AHSD	CG - Good	CG - Poor
1	4.26	3.28	2.72
2	3.22	3.76	2.74
3	3.10	2.06	0.80
4	2.98	2.04	1.08
5	2.80	0.76	0.80
6	1.98	0.82	0.68

Soil Microbial Populations

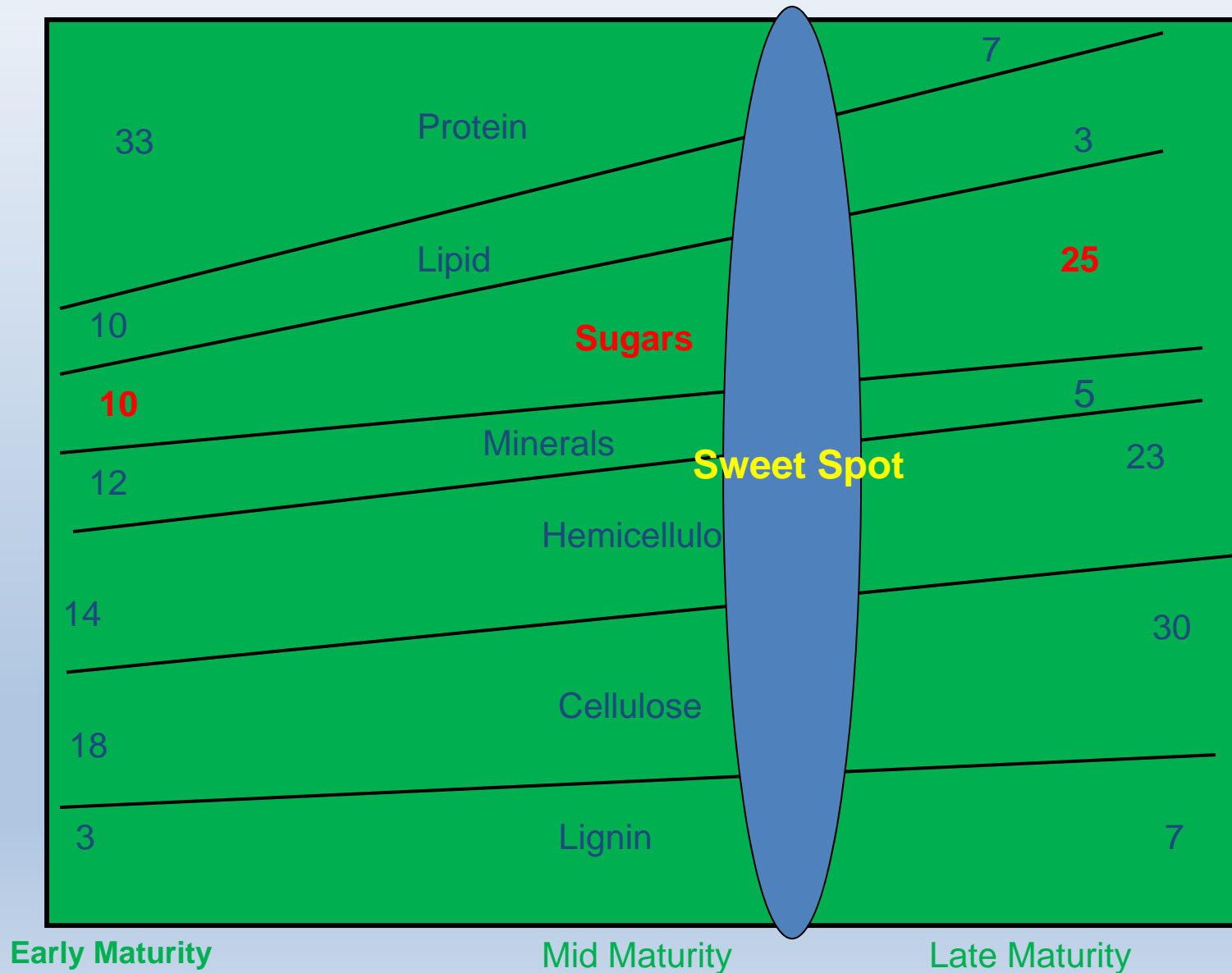
- Total Living Microbial Biomass (TLMB) – ng/g
 - 2368 ng/g to 8756 ng/g (4 years)
 - 986 ng/g to 7342 ng/g (5 years)
 - 1987 ng/g to 11234 ng/g (6 years)
 - 2198 ng/g to 9432 ng/g (5 years)

Forage DM Yield in High vs. Low Microbial Activity Fields

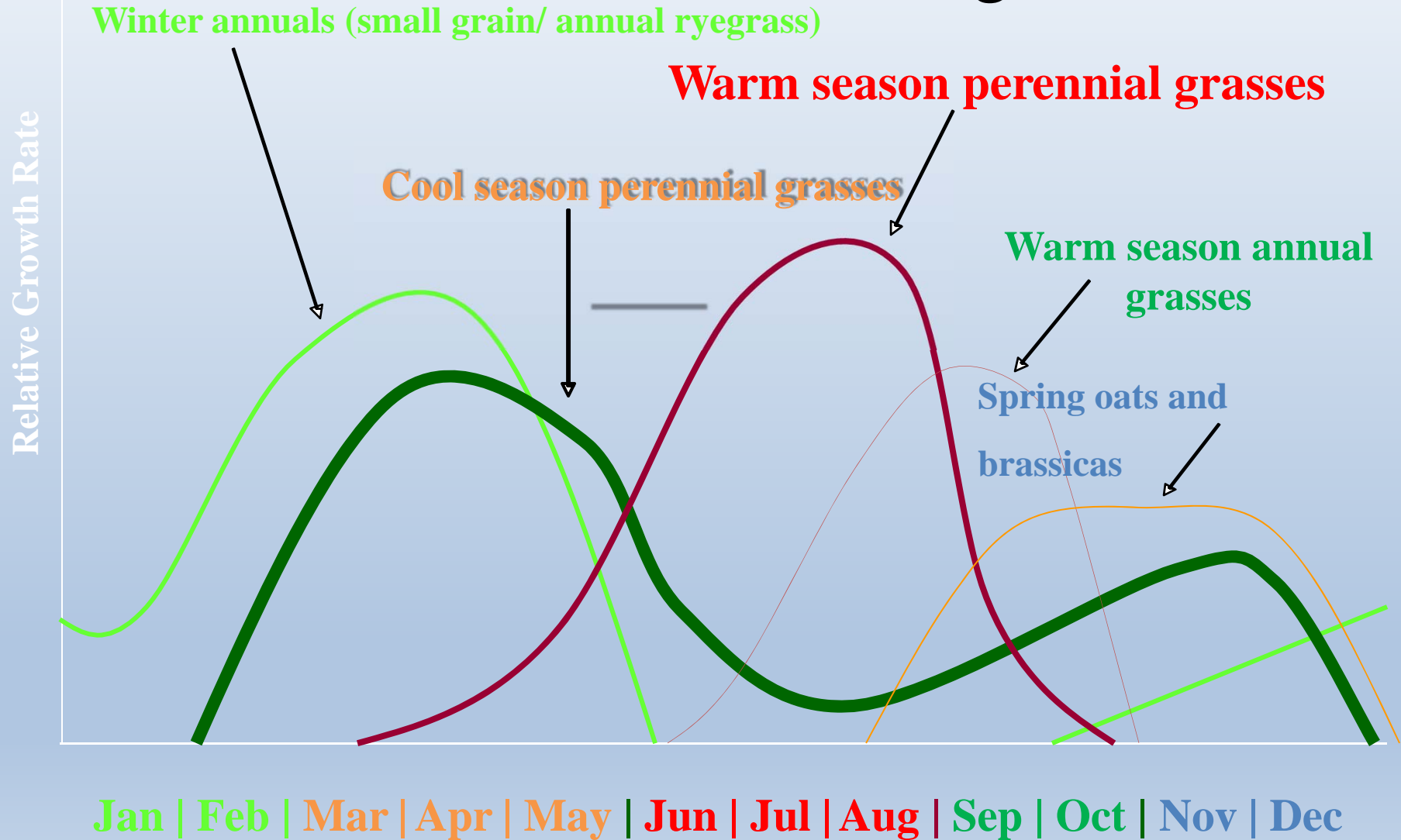
Variable	High Microbial Activity	Low Microbial Activity
Dry Matter (lbs/ac)	8573	2559
Crude Protein (%)	11.9	7.9
TDN (%)	69.4	55.7

Source: USDA NRCS Mandan, ND.

Effects of Stage of Maturity on Pasture Composition



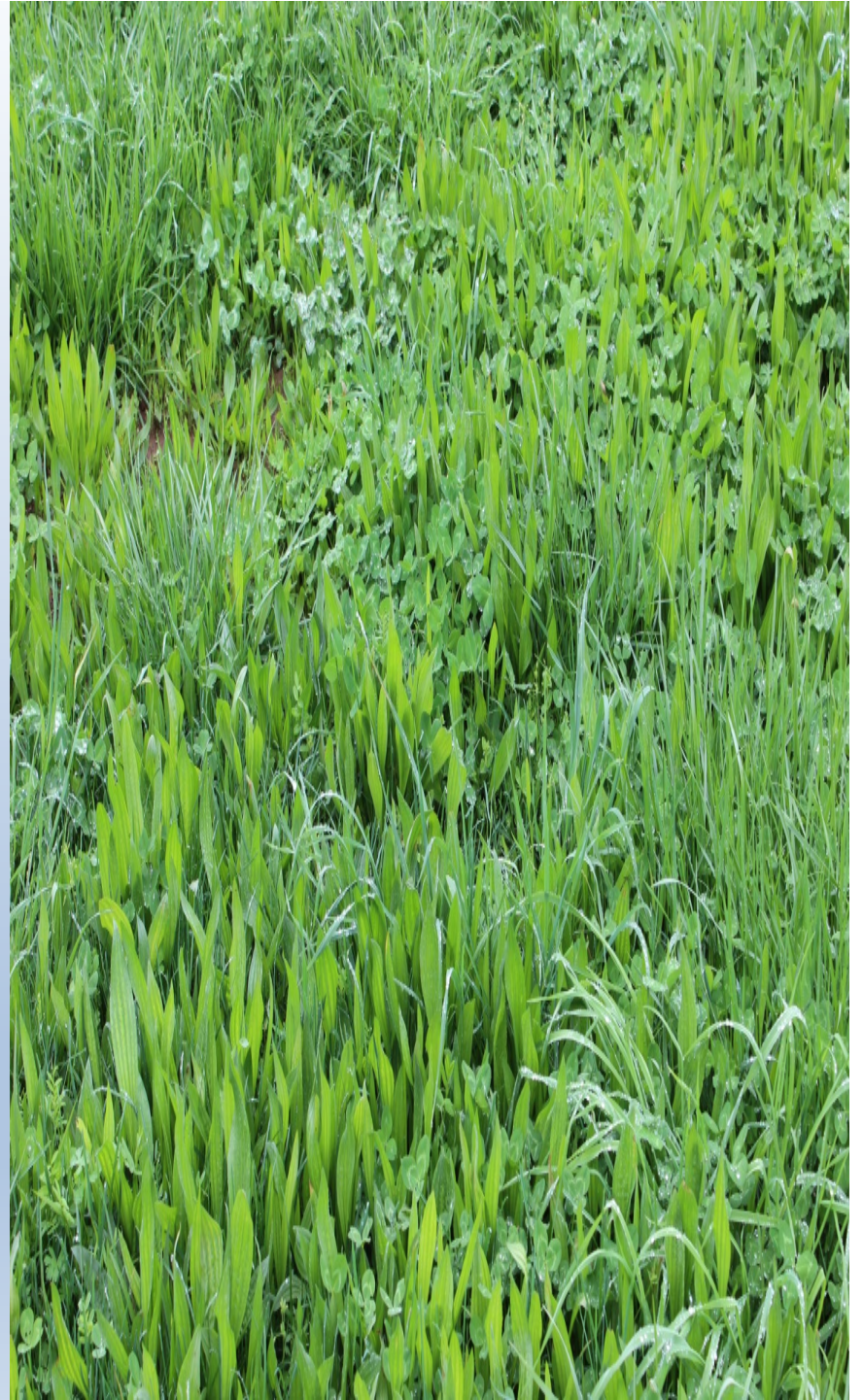
Forage Sequence Options for Year Round Forage



Percentage of each species will vary relative to yield

Diversity & Complexity Is Key





Recommended Forage Types

- Good Mix of:
 - Grasses – Warm (C4) and Cool (C3) Season
 - Perennials and Annuals
 - Legumes – Clovers, medics, trefoils - Vetches, alfalfa, lespedeza, winter pea, cow pea, mung bean, etc...
 - Forbs – Herbaceous broadleaf plant that is not a grass or grass-like – Plantains, Docks, Dandelion, chicory, comfrey, small burnet, sunflower, etc.
 - Can include:
 - Brassicas – mustards, biennials.

Measures of Forage Quality

- Plant Tissue Analysis
 - CP – Rumen Degradable and Bypass Proteins
 - TDN – Total Digestible Nutrients
 - ADF - estimates digestible dry matter (DDM) content
 - NDF - estimates potential dry matter intake (DMI)
 - NEm, NEg, Nel – Net Energy
 - RFV vs RFQ – Feed Value vs Forage Quality
 - WSC and NSC – Simple sugars, starch, fructan
- Plant Brix

What to Use?

- What is most efficient, effective?
- What is cost? In \$\$ and time?
- What are you measuring? What are you grazing?
- What can producers most understand and implement?
- To be effective a measure of forage quality must be low cost, easily measurable, observational, and implementable on a daily basis.

BRIX

- Dissolved plant solids include **sugars** (such as sucrose and fructans), **minerals**, **amino acids**, **proteins**, **lipids** and **pectins**.
- About **50-80%** of the Brix measurement represents plant sugars, with the remaining portion representing the other plant solids.

What is a Refractometer?

- A simple optical instrument that measures that amount of light refracted in a liquid.
- Standard piece of equipment for many agronomists and commonly used in the fruit and vegetable industries.



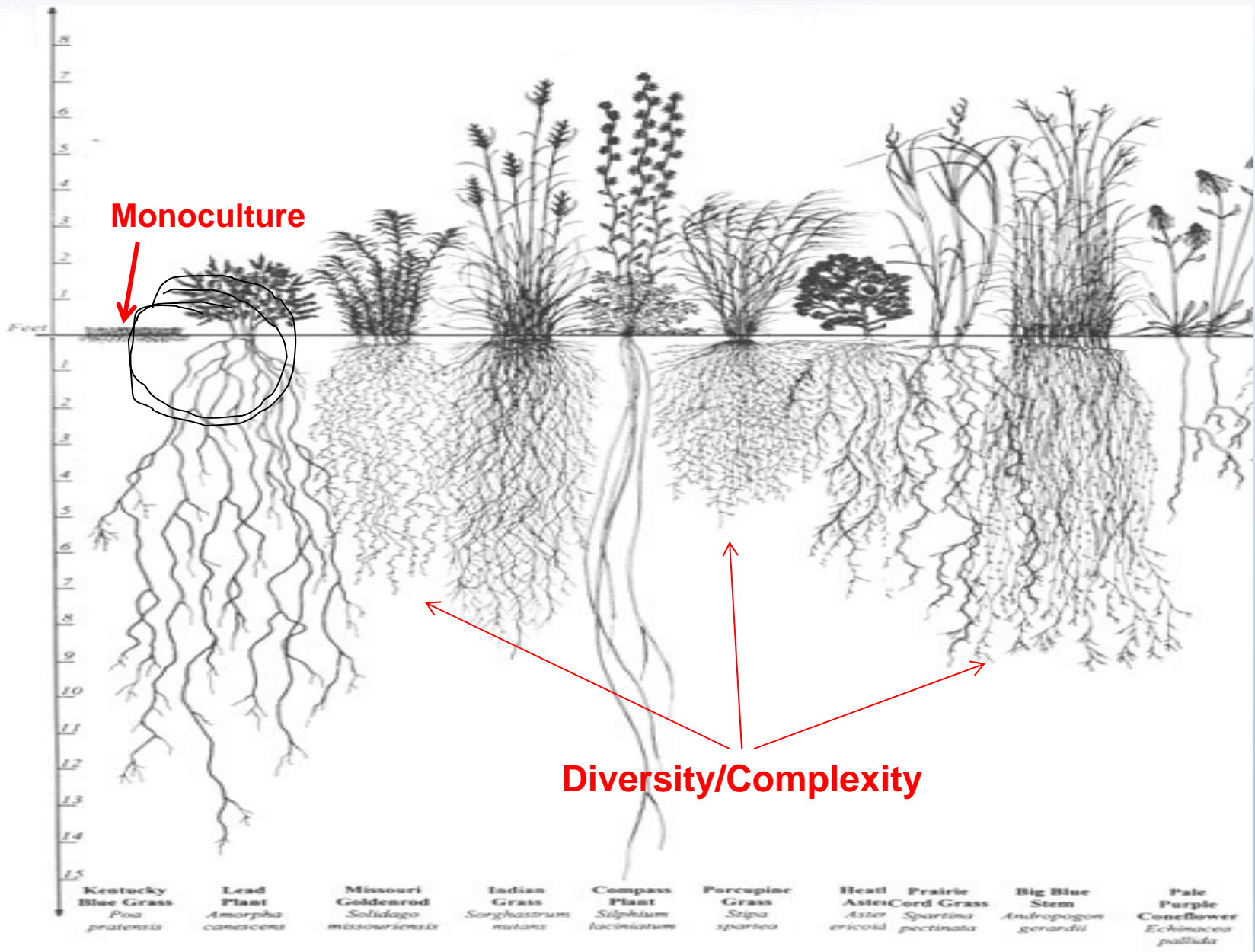
Why High Brix in Forages?

- Research shows that High Brix forages increase animal gains and milk production.
- High Brix Forages also are more drought resistant, freeze tolerant, and more resistant to plant disease and pests
 - (Moorby, 2001).
 - (Moller, 1996).
 - (Downing & Gamroth, 2007; Miller, et al, 1999).
 - (Allison, 2007).
 - (McKenzie, 2007).



Brix Advantage

- Brix 5.0% or less = ADG in low 1's.
- Brix 8-12% = ADG in low to mid-2's.
- Brix 12 – 15% = ADG in mid-high 2's.
- Brix > 15% = ADG in high 2's to 3's.
- Every 1.0% increase in Brix adds 0.1 to 0.3 ADG.



Root Systems of Prairie Plants

Kent Solberg



- Kent currently serves as the Livestock and Grazing Specialist for the Sustainable Farming Association.
- Kent and his wife Linda own and operate a grass-based livestock farm near Verndale, MN.
- Kent has been involved in planned grazing and pasture based livestock systems 25 years.
- For the past 7 years he has used cover crops and seeded annuals to extend the grazing season and improve soil health.
- He has taught college courses and presented at numerous workshops on forages, fencing, grazing, soil health and livestock management.

Improving Pastures

- Reduce occupancy duration
- Increase length of rest periods
 - Tap into the power of the latent seed bank and animal impact.
- “Plant fence posts first!”
- Fertilizer, inter-seeding, reseeding

Pasture Goals = What are you trying to accomplish?

- Landscape = soil and plant community health and vigor
- Animal performance
 - May need to focus on landscape first to meet ultimate goal of animal performance
- Limits (stocking rates) – soils, climate
- Balance needs of animals with land capabilities.

Pasture forage types

- Sod forming grasses
 - Kentucky bluegrass, smooth brome, quack grass
- Bunch grasses
 - Orchard grass, big blue stem, meadow fescue
- Legumes – nitrogen fixers
 - Alfalfa, clovers, birdsfoot trefoil

Strive for diverse pastures = soil and animal health, pasture productivity (ability to capture light).

Pasture Forage Types

- Jointing grasses
 - Timothy, smooth brome, reed canary
 - Elevated growing points
- Non-jointing grasses
 - Orchard grass, tall fescue, perennial ryegrass
 - Growing point at crown (ground level)

All cool season grasses grow only from crown in the spring.

Pasture forage types

- Cool season grasses – orchard grass, smooth brome
60 - 77° F
- Warm season grasses
85 - 100° F

How large a paddock?

- 50 jerseys @ 1000 #'s = 50,000 #'s
- 50,000 #'s x 3% BW = 1500 #'s DM/day
- 1500 #'s DM/day ÷ 1200 #'s/acre DM = 1.25 acres/day
- Observe!
 - Residual heights
 - Livestock response – gain, milk production, rumen fill, activity, etc.
 - Adjust as necessary

Stocking Density = pounds of livestock on a given unit of pasture at one time (e.g. concentration)



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Association - sfa-mn.org

Stocking Rate = total number of animals your pasture will support.



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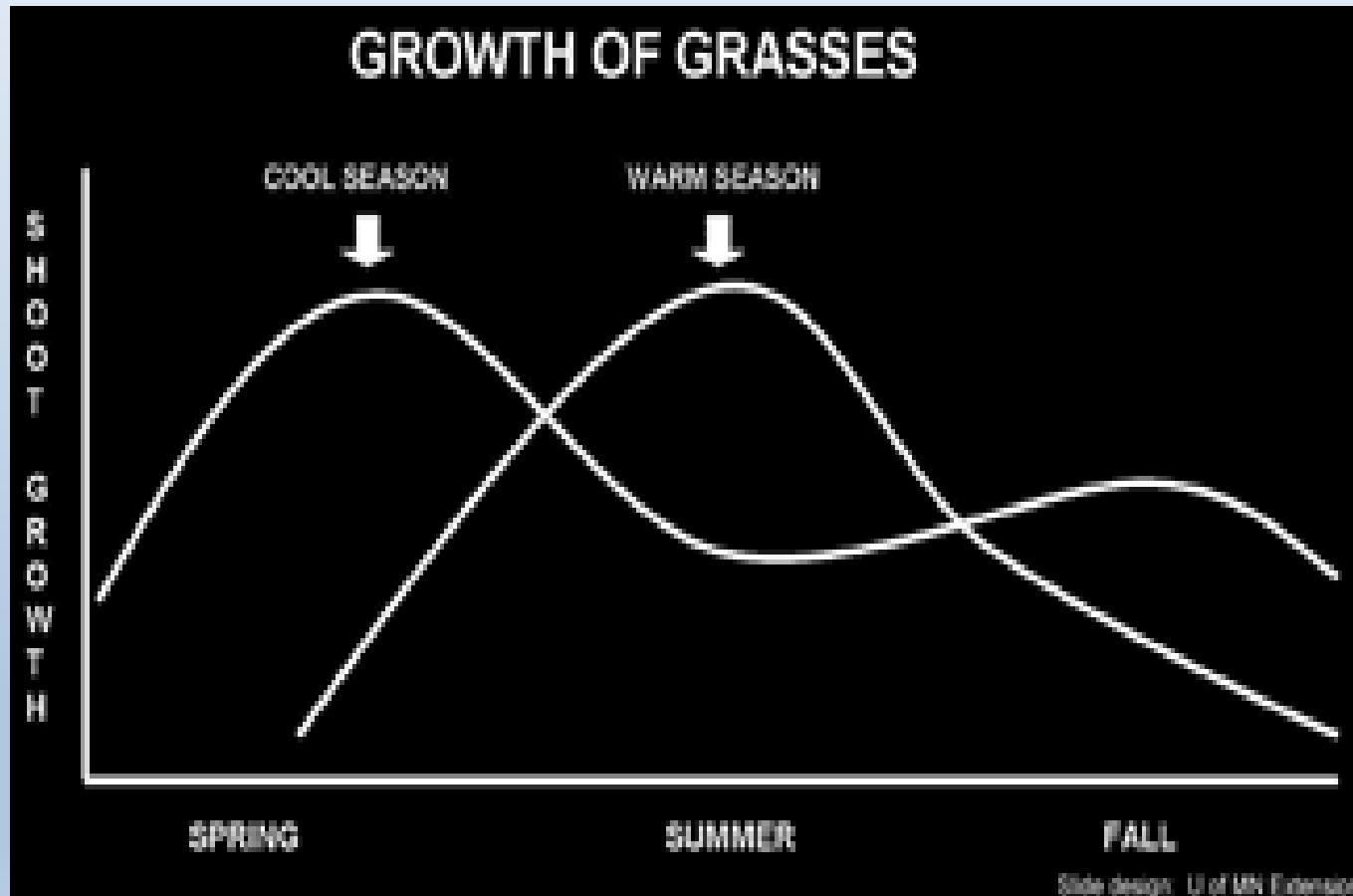
Available Forage

- Collect your data:
 - Average forage height (inches)
 - Estimated dry matter in pounds/acre inch.

Available Forage

- Example:
- 16" average forage height
- Take 50%
- 8" available forage
- 8" available forage X 150 #'s/acre DM = 1200
#'s/acre DM

Pasture Forage Types



Pastured Livestock Resources:

- NRCS Pasture & Range Handbook: Chapter 6, Livestock Nutrition, Husbandry & Behavior, <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>
- ATTRA: Ruminant Nutrition for Graziers, <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=201>
- Pasture-based Livestock Production, NRAES 187 (4 book series) Plant & Life Sciences Publishing, Cornell University, http://palspublishing.cals.cornell.edu/nra_order.taf?_function=view&ct_id=24
- eXtension: <http://www.extension.org/> and your local/state Extension Service for resources on related grazing & livestock production topics
- Utah State BEHAVE website: <https://extension.usu.edu/behave/> (grazing animal behavior information)

Resources

- www.attra.ncat.org
- http://www.plantsciences.ucdavis.edu/gmcourse/module_resources/module4/Resources/readings/ruminant.pdf
- <http://forages.oregonstate.edu/nfgc/eo/onlineforagecurriculum/instructormaterials/availabletopics>
- <http://forages.oregonstate.edu/nfgc/eo/onlineforagecurriculum/instructormaterials/availabletopics>
- <http://forages.oregonstate.edu/nfgc/eo/onlineforagecurriculum/instructormaterials/availabletopics>

Future Webinars



SCHEDULE
9:00-10:30 AM CDT

MAY 15
Teaching the Basics of
Grazing

JUNE 5
Grass-based Farm Financials

JULY 10
Adaptive High Stock Density
Grazing

AUGUST 7
Integrating Livestock into
Cropping Systems

SEPTEMBER 11
Grazing for Conservation and
Soil Health

OCTOBER 9
Teaching Resources
Roundtable

All sessions will be online and archived for future use. To sign up for the initial session or receive reminders about future sessions, you can register with us [here](#).

Are you a grazing specialist, land manager, or grazing educator?

Want to be involved in the development of grazing education?

If so, please [join us in our webinar series](#), hosted by [Green Lands Blue Waters](#) and [The Pasture Project](#).

The monthly series will present topics important to grazing, with perspectives from scientists, experts, and producers.



The webinars are free, and will be designed to encourage an active and lively discussion on issues important to the grazing community.

Look for more information about the series and the first webinar, scheduled for May 15th, at our websites. Contact [Jane Jewett](#) or [Warren King](#) with any questions.

Green Lands Blue Waters





Thank you!