Keys to a Successful Pasture-Based System

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University of Missouri Pasture-Based Dairy Team

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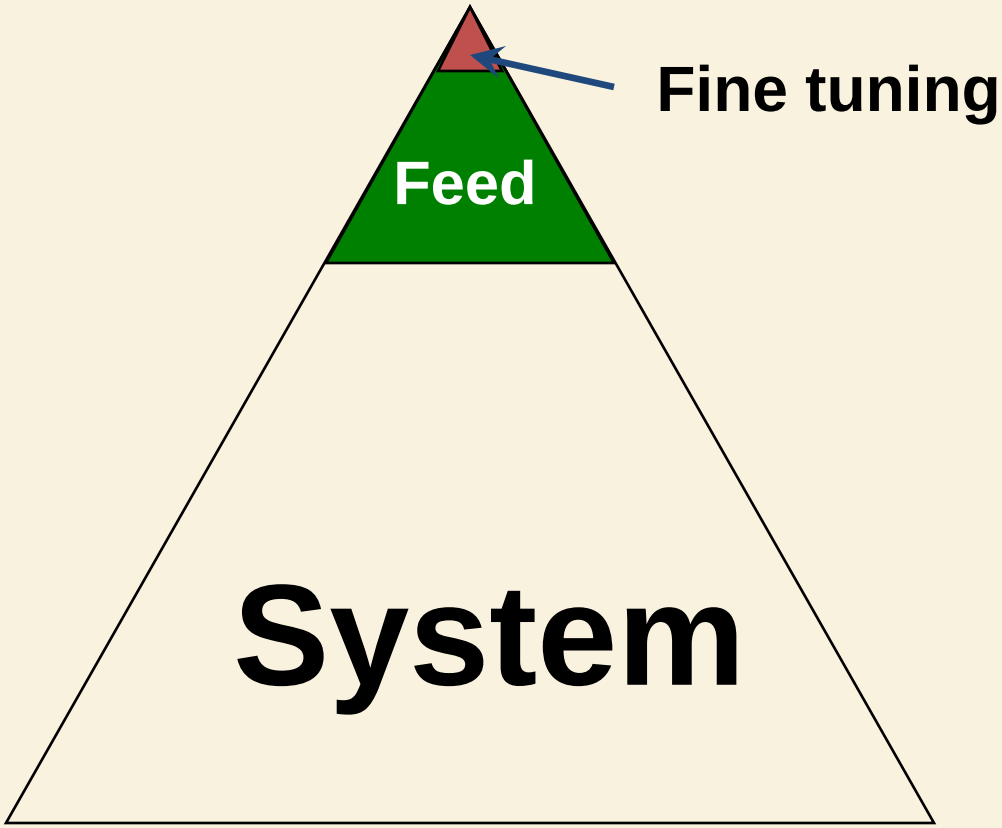
Get the priorities right



80% of potential gain made by getting the system right

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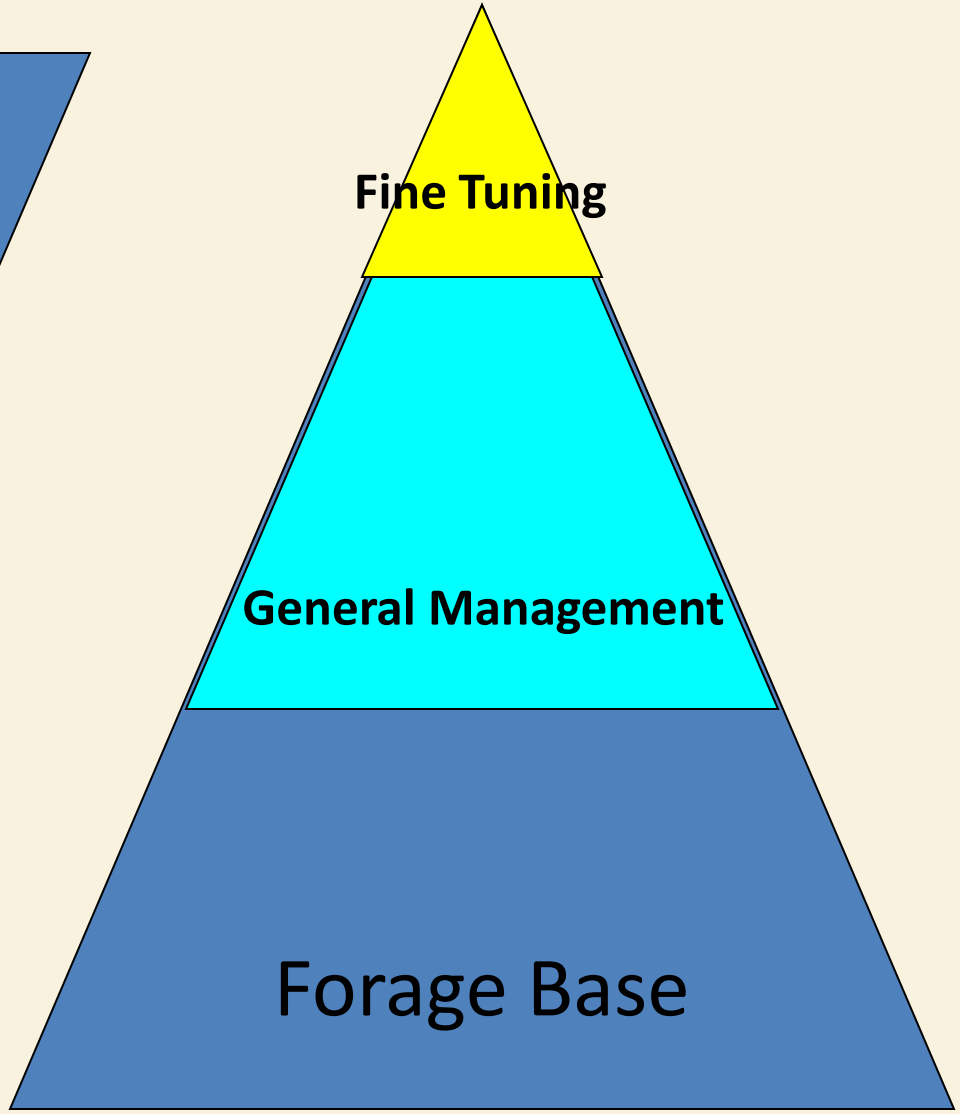


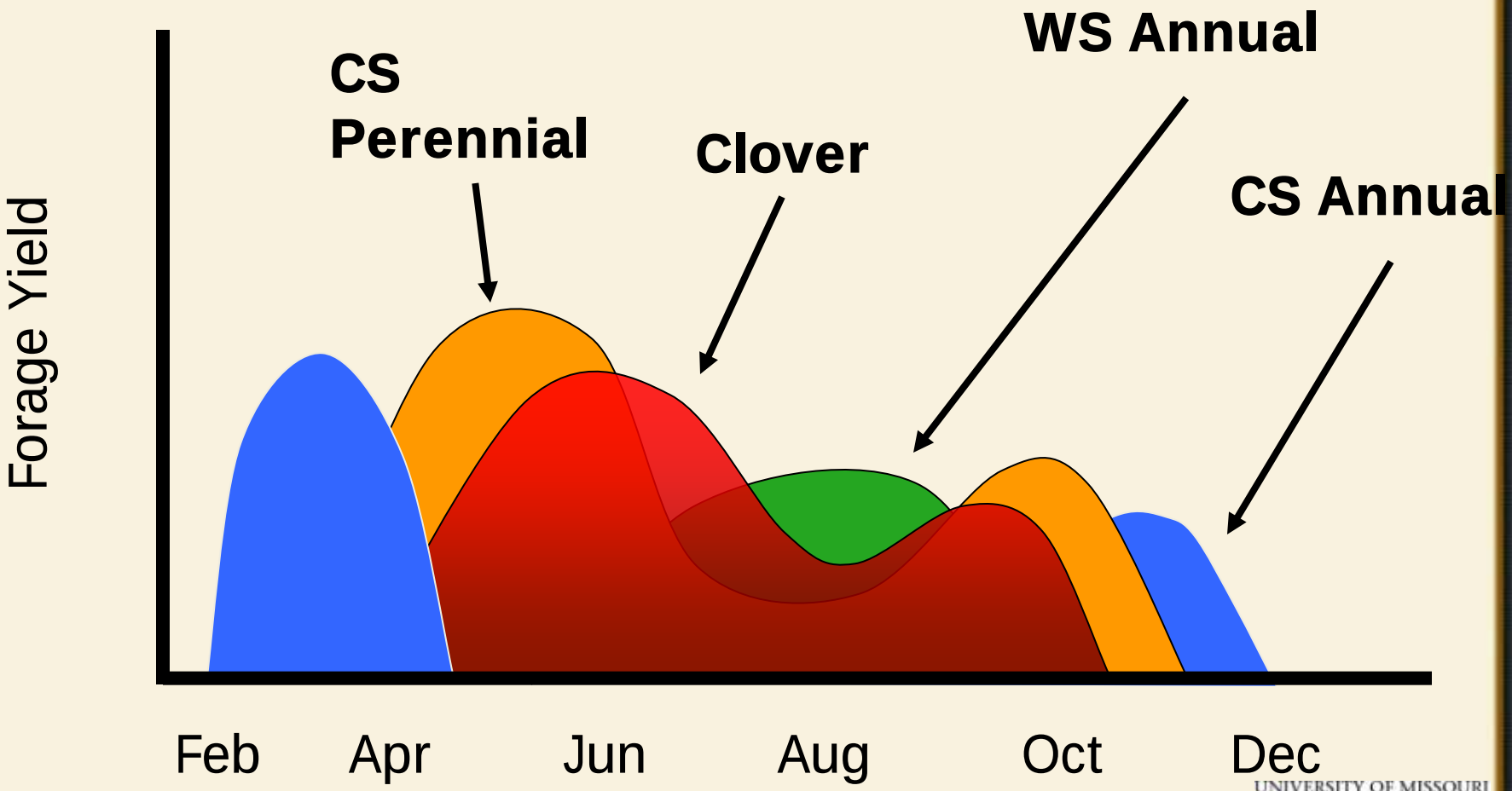
Forage Systems

- Must be your first consideration!!!!

Forage Systems

- Balancing <8# harvested forage c/d
  - Species
  - Production vs. Need
- Yield > 5 tons DM/acre
- Intake Potential >3% BW DMI

A Simple System



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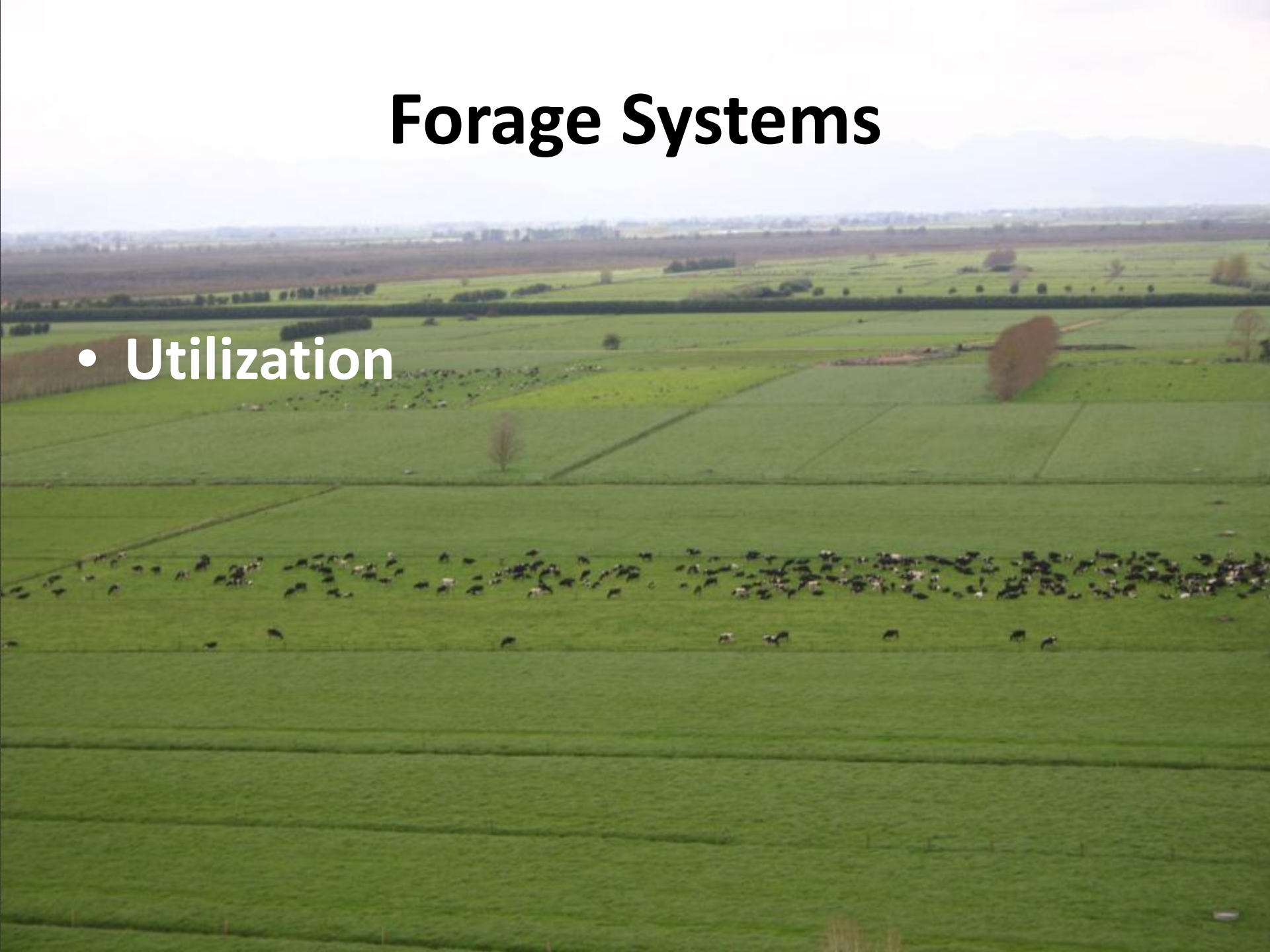
Forage Systems



- Utilization

Local Beef Industry Investment Cost?

- **Good Pasture Land Cost $1700?? / acre here**

- **@ 4.2 acres/ cow =$7140**
- **Cow =$1800 ?**
- **Machinery / =$2000 ?**
- **Buildings, facilities =$1500 ?**
- ***total* =$12440 ??**

Local Beef Industry Investment Cost?

- **Good Pasture Land Cost $1700?? / acre here**

- **@ 2.1 acres/ cow =$3570**
- **Cow =$1800 ?**
- **Machinery / =$2000 ?**
- **Buildings, facilities =$1500 ?**
- ***total* =$8870 ??**

Carrying capacity of pasture is determined by four factors (cont.)

$$\text{Carrying Capacity} = \frac{\text{Forage Production} \times \text{Seasonal Utilization Rate}}{\text{Daily Intake} \times \text{Length of the Grazing Season}}$$

Grazing Efficiency

Number of Paddocks	Approx. Days on Paddock	Grazing Efficiency - %
Continuous	--------	<40
4 - 6	7 - 9	40 - 55
8 – 10	4	55 - 65
24 - 45	1 or less	70 - 80
Hay	--------	70 - 80

Cows/acre based on Yield & Utilization

$$\text{Carrying Capacity} = \frac{\text{Forage Production}}{\text{Daily Intake}} \times \frac{\text{Seasonal Utilization Rate}}{\text{Length of the Grazing Season}}$$

Utilization	35%	45%	55%	65%	75%	85%
Yield/acre						
1	0.14	0.18	0.22	0.26	0.3	0.34
1.5	0.21	0.27	0.33	0.39	0.45	0.51
2	0.28	0.36	0.44	0.52	0.6	0.68
2.5	0.35	0.45	0.55	0.65	0.75	0.85
3	0.42	0.54	0.66	0.78	0.9	1.02
3.5	0.49	0.63	0.77	0.91	1.05	1.19
4	0.56	0.72	0.88	1.04	1.2	1.36

Harvest Efficiency

- **Lbs. produced Lbs Harvested Efficiency**
  - **(Per acre) (Per acre) (seasonal)**

2010-	**7995**	**6440**	**81%**
2011-	**8048**	**6330**	**79%**

Turn in ht. 7-8 residual ht. 3.5-4 inches???

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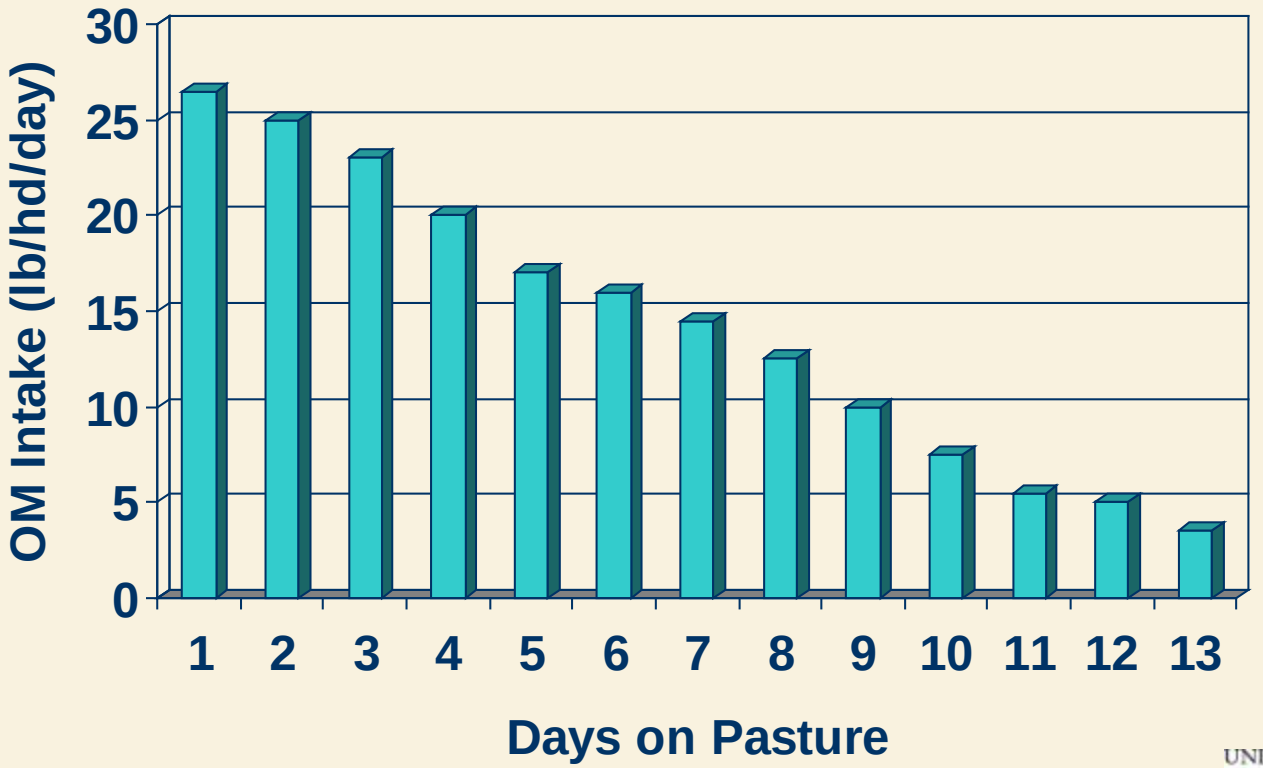
Forage Systems

- Utilization
- How you graze

Impact of Days on Paddock on Organic Matter Intake



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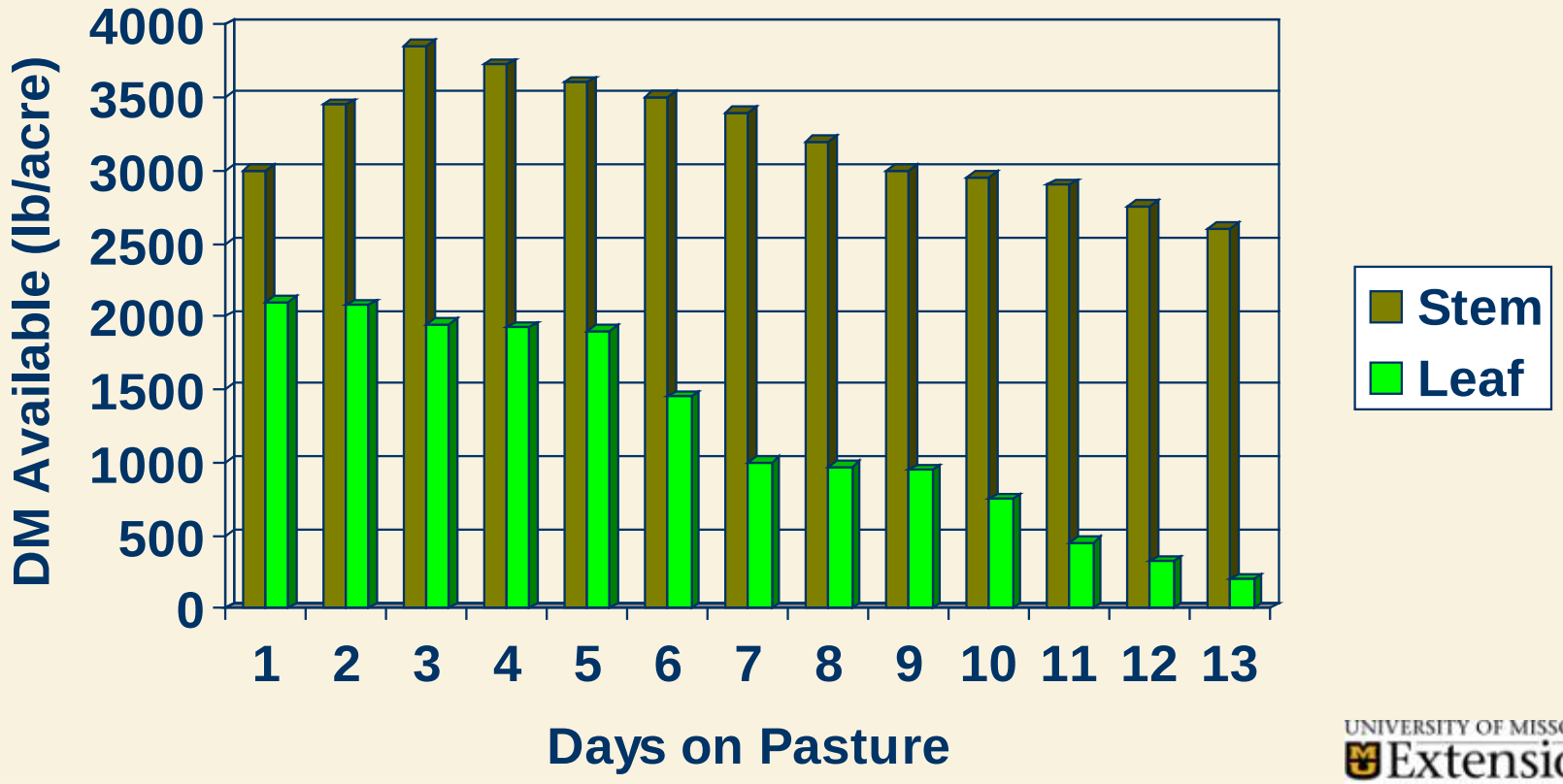
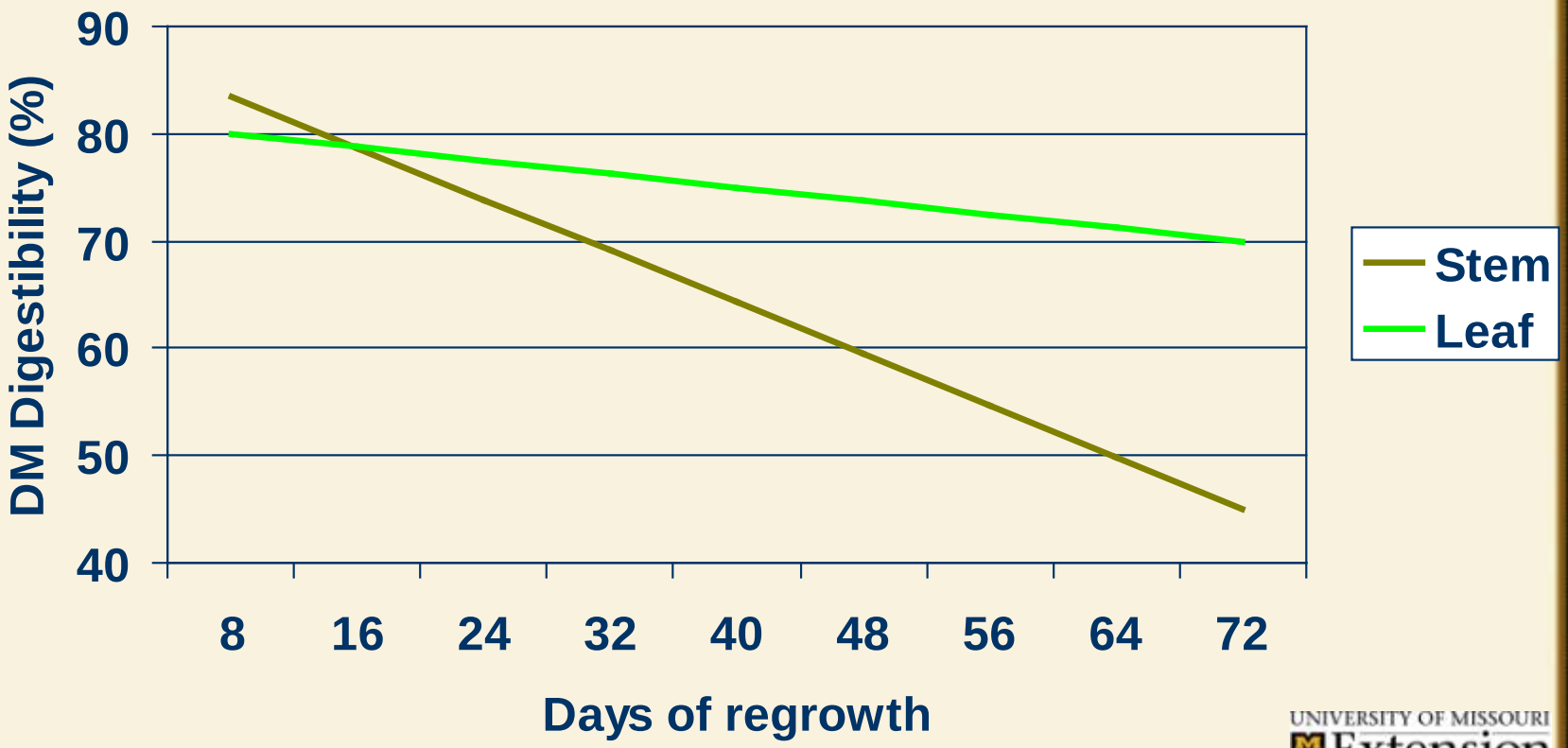
Impact of Days on Paddock on Change in Sward Composition



Change in Quality of Orchardgrass Stem and Leaf Regrowth with Time



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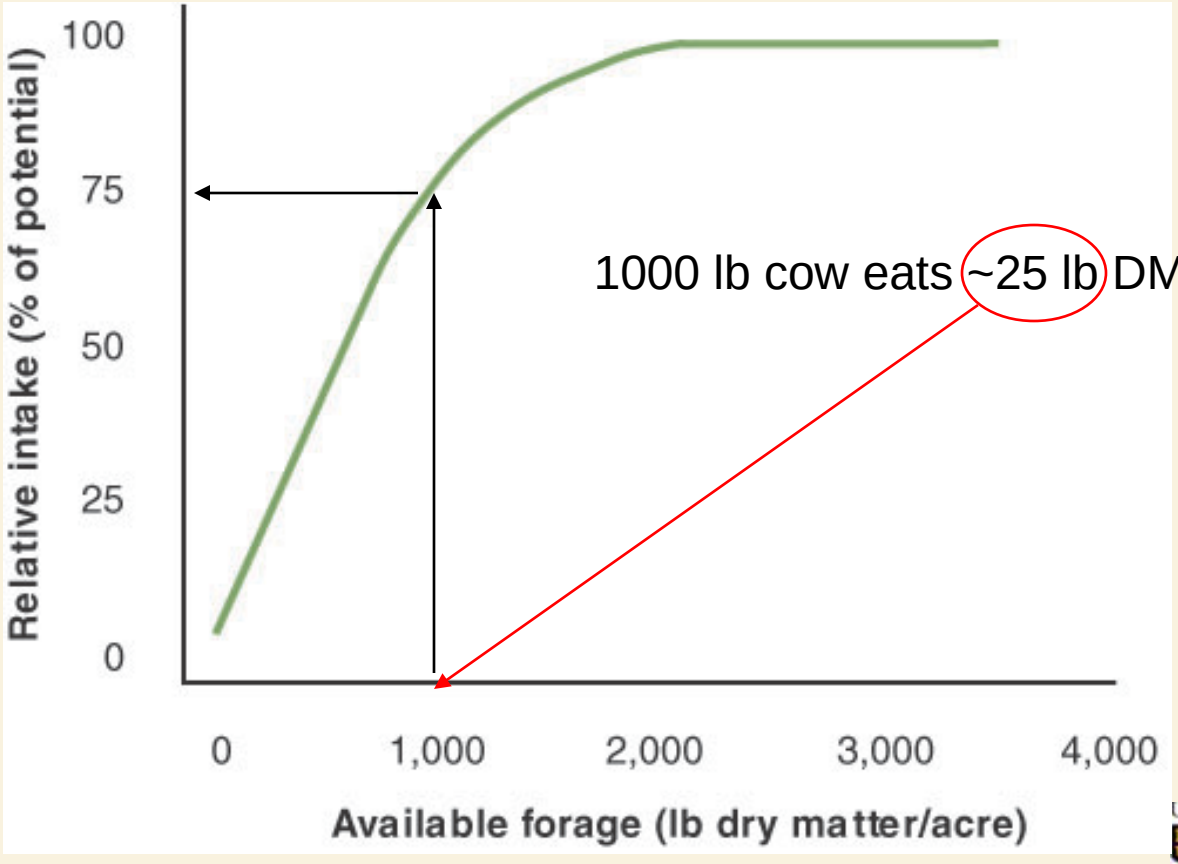
Effect of forage availability on relative forage intake



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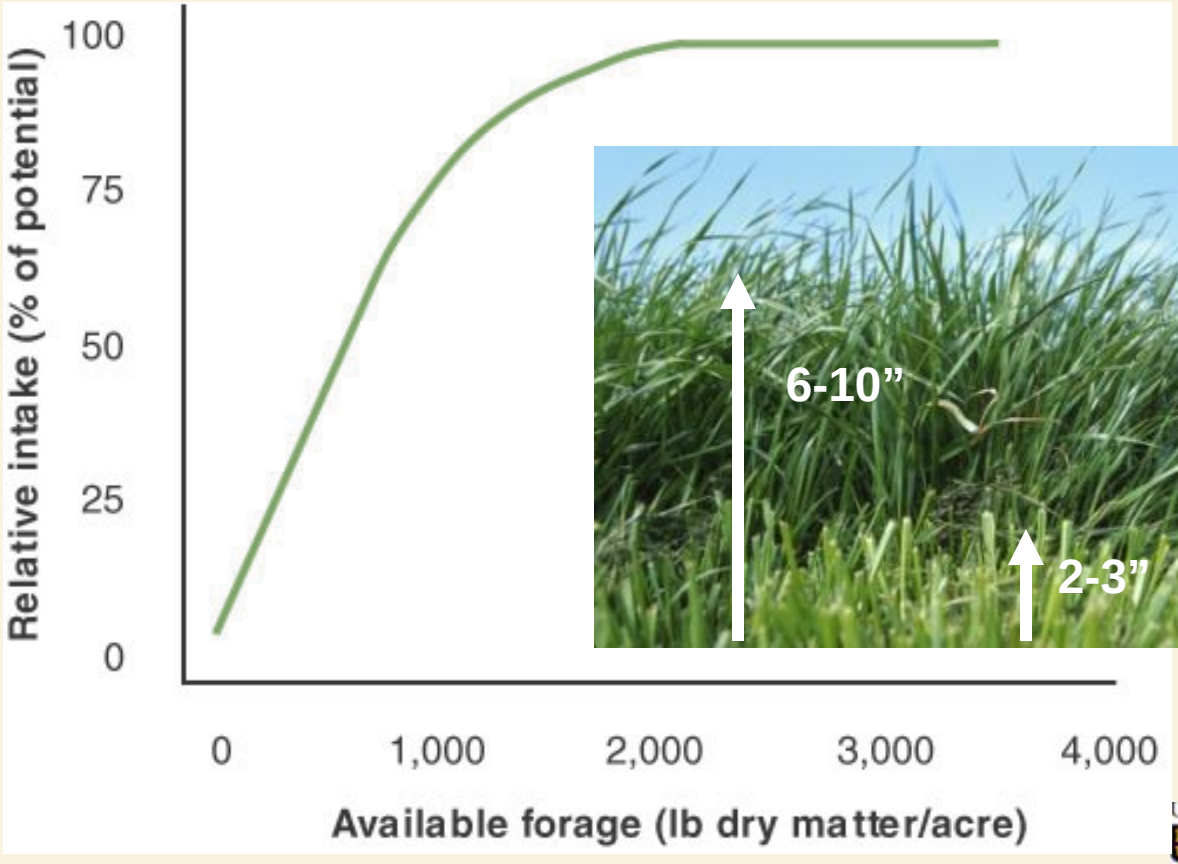
Effect of forage availability on relative forage intake



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Factors Affecting Intake

BITING

BEHAVIOR

Dry matter intake =

Biting Rate x Biting (grazing) Time x Bite Size

Factors Affecting Intake

- Biting Rate
  - Cattle average 50 - 65 bites per minute
  - Can increase for short periods
  - Fatigue limits increase in intake

Factors Affecting Intake

- Biting Rate
- Biting (Grazing) Time
  - Cattle graze 8 - 10 hr per day
  - Rumination (cud chewing) up to 10 hr per day
  - Time ***not*** biting or chewing
  - Sleeping
  - Only 24 hours in a day

Factors Affecting Intake

- Biting Rate
- Biting (Grazing) Time
- Bite Size
  - Cattle average 0.3 g (0.01 oz) DM per bite
  - Measured range of 0.07 g (0.002 oz) to 0.59 g (0.02oz) per bite
  - Related to availability

Factors Affecting Intake

Dry matter intake =

50 bites/min x 600 min/day x 0.3 g/bite =

9.0 kg or 19.8 lb DM intake per day

Factors Affecting Intake

If bite size is only 0.07 g/bite

50 bites/min x 600 min/day x 0.07 g/bite =

2.1 kg or 4.6 lb DM intake per day

Factors Affecting Intake

If bite size is only 0.07 g/bite

50 bites/min x 600 min/day x 0.07 g/bite =

2.1 kg or 4.6 lb DM intake per day

If bite size is 0.59 g/bite

50 bites/min x 600 min/day x 0.59 g/bite =

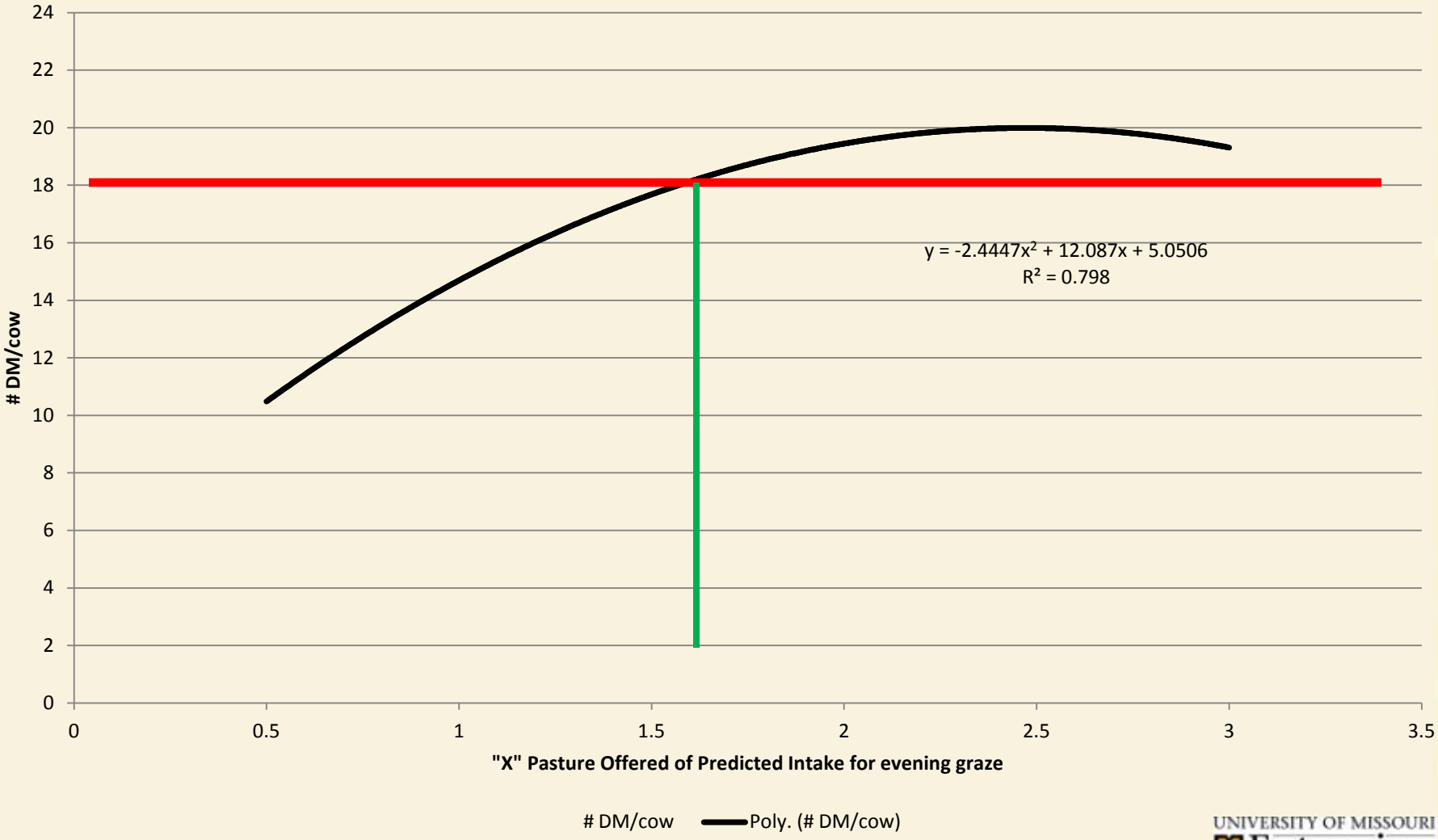
17.7 kg or 38.9 lb DM intake per day

Suggested Pasture Allowance

- Unrestricted pasture allowance still yielded DMI of 5-8#/cow/day less DMI than TMR counterparts thus milk yield
- Recommendation to provide 2 times desired DMI
- Or 55#/cow when feeding supplements (Bargo et al)

Demonstration of allocation area on Pasture Intake

Comparison of “50-300%” of Predicted DMI



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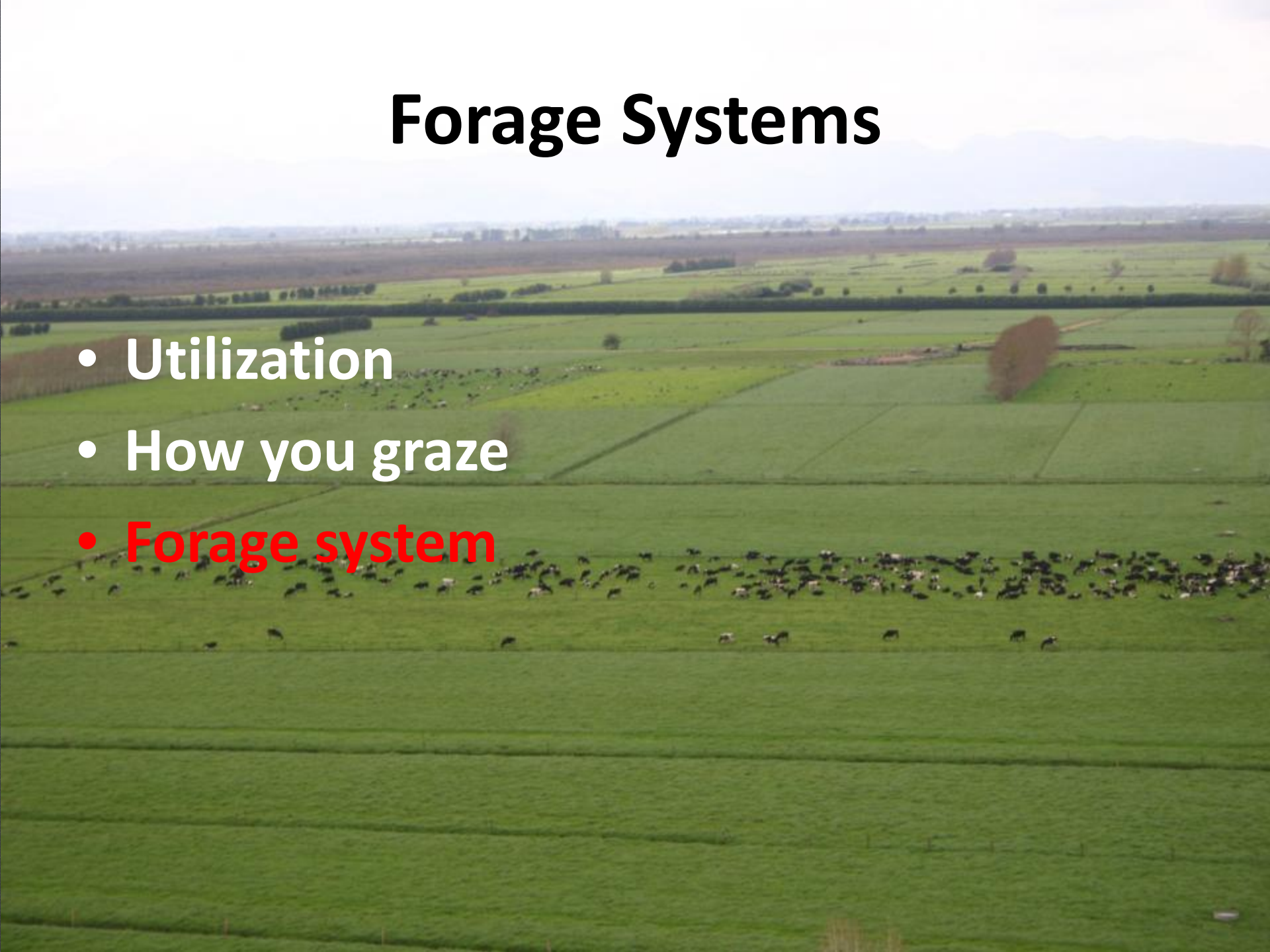
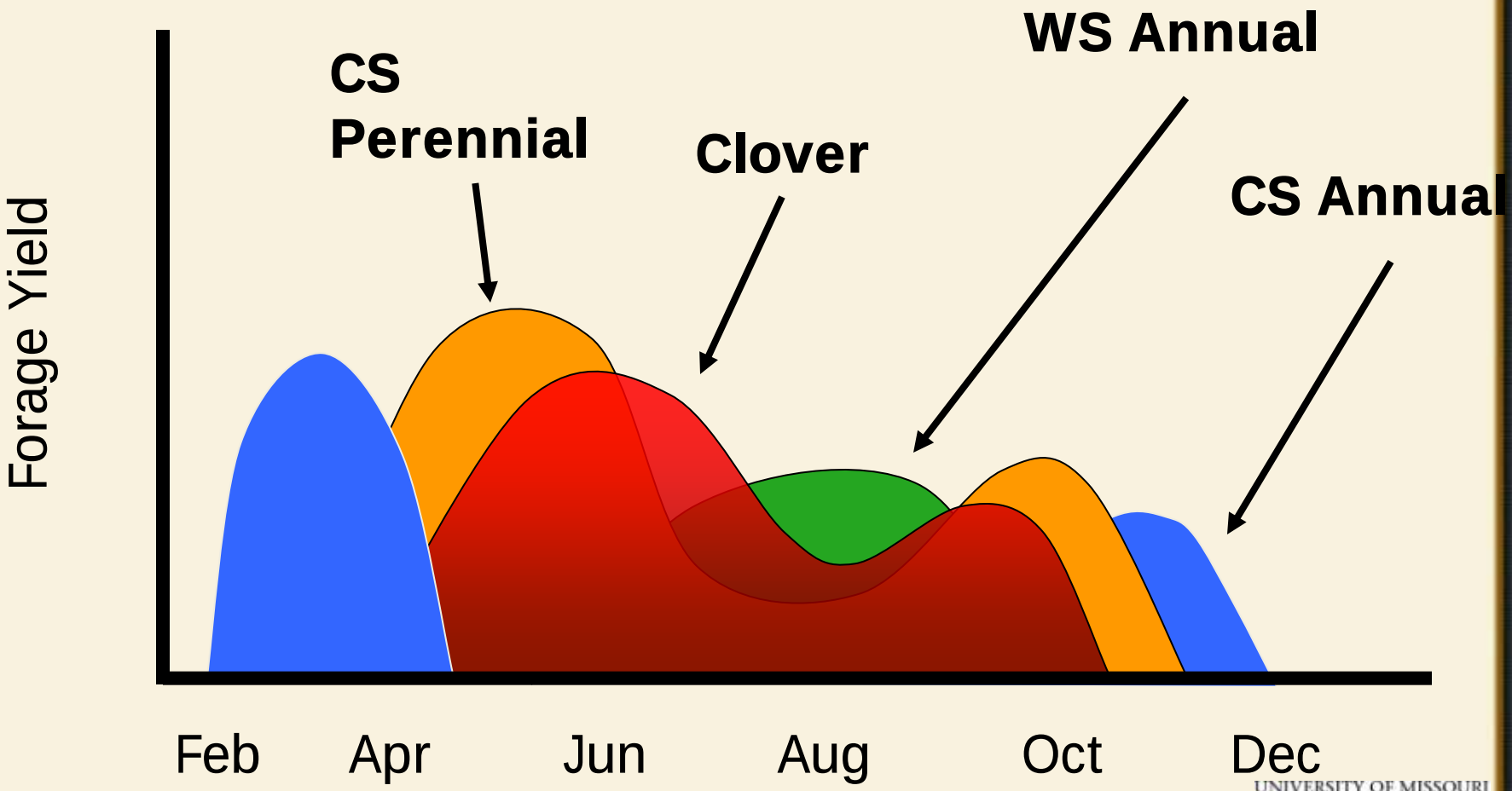
Forage Systems



- Utilization
- How you graze
- Forage system

A Simple System



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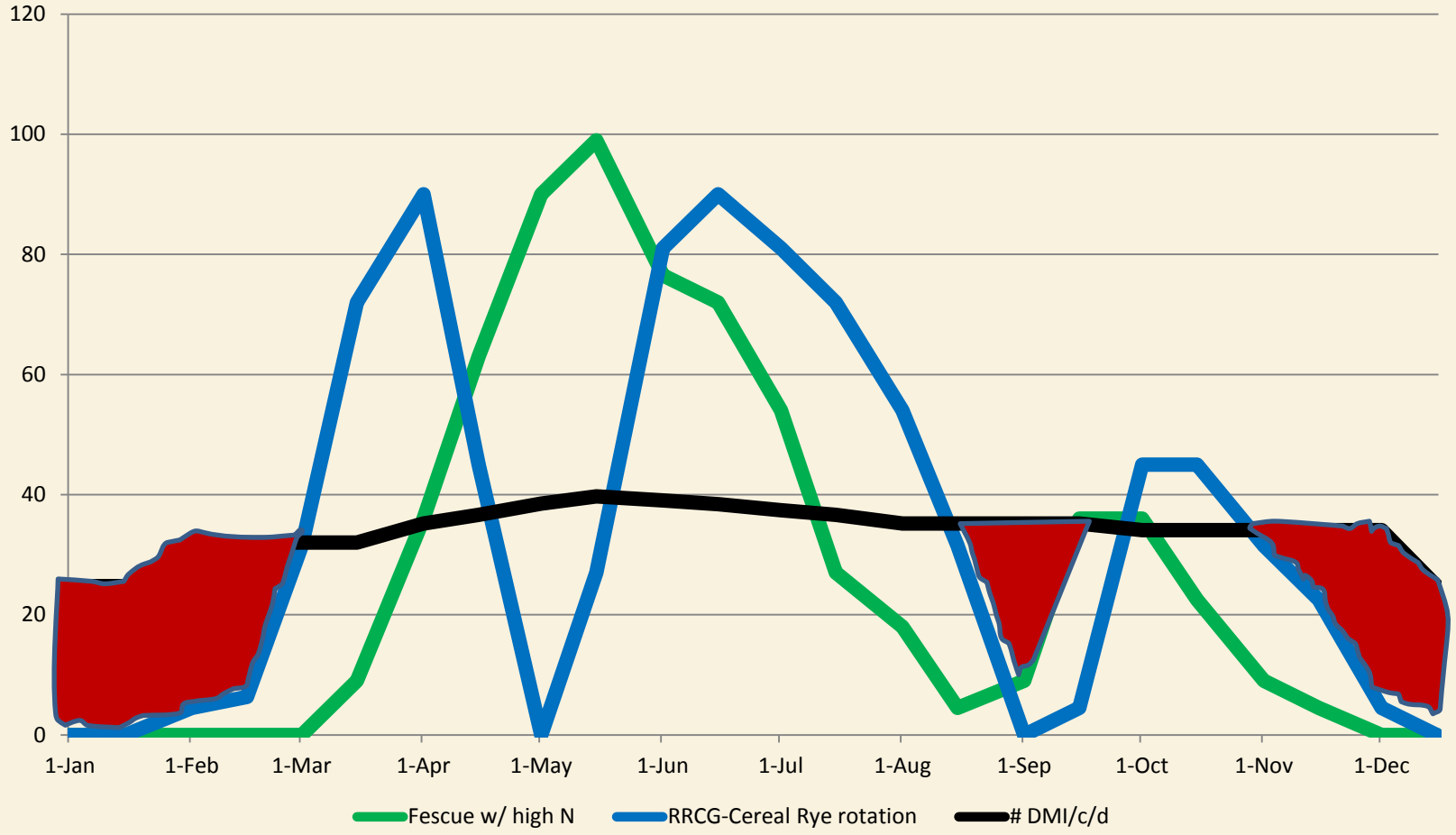
Growth Rate-Feed Demand Relationship

Stocking Rate 1 Cow to 1 Acre



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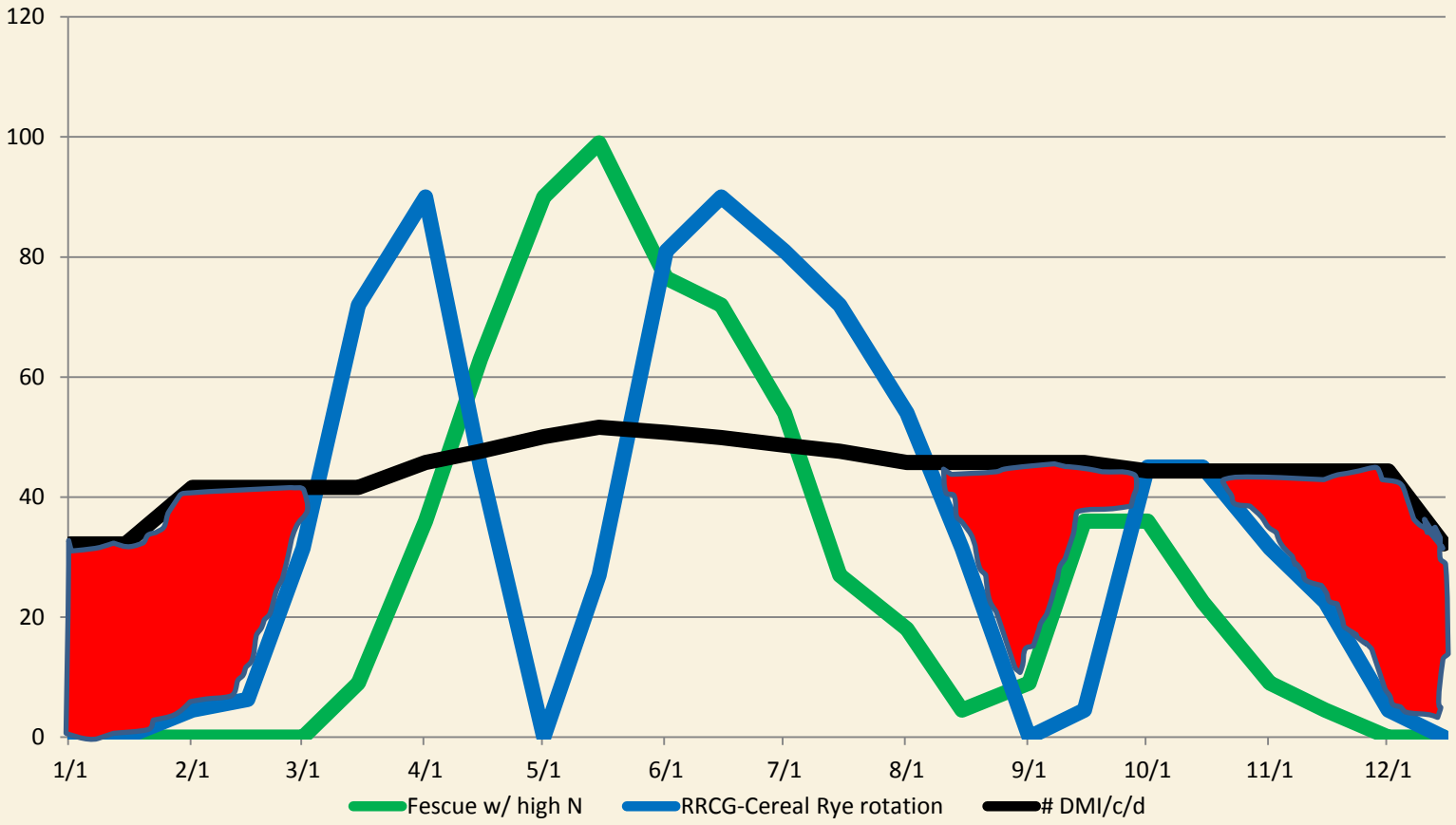
Growth Rate-Feed Demand Relationship

Stocking Rate 1.3 Cow to 1 Acre



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Definitions and Concepts

- Feed Budget
  - Annualized methodology to determine weekly or bi-weekly feed requirements of the grazing platform
  - Utilizes historical growth rates of forages to predict:
    - Surplus/deficits in pasture forage
    - Supplemental feeds
    - Forage mechanically harvested on grazing platform

Excel Spreadsheet displaying Annualized Feed Budget

# cows	110	stocking rate	1.34	12251.88	milk yield
# acres	82				
wt cows	1100				
% DMI	0.031				
# DM day	34.0				
grazing efficiency	0.85				

		DROP DOWN MENU	% farm		
	Forage	Perennial Ryegrass	0.378	31.0	
	Forage	Fescue w/ high N	0.378	31.0	
	Forage	RRCG-Cereal Rye rotation	0.171	14.0	
	Forage	1	0	0.0	
summer stand-off	Forage	Bermuda-Cereal Rye	0.073	6.0	
				82.0	add forages (doubled cropped only once)

	# cow/day	%	cost	0	# milk for days
sudan balage/c/d	8.1	22.0%	0.05	0.37	45.0
grain c/d	6.5	17.6%	0.09	0.58	
purchased hay c/d	0.8	2.1%	0.07	0.05	
wrapped hay on farm	3.3	8.9%	0.05	0.15	
GRASS	18.2	49.4%	0.03	0.55	
				0.00	
TOTAL	36.9	100.0%		1.70	cost/cwt
forage off farm		58.3%			3.771368

DM grass grown per day

	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	1-Jul	15-Jul	1-Aug	15-Aug	1-Sep	15-Sep
Perennial Ryegrass	0	0	0	0	5	18	45	68	90	90	72	68	36	32	5	0	5	27
Fescue w/ high N	0	0	0	0	0	9	36	63	90	99	77	72	54	27	18	5	9	36
RRCG-Cereal Rye rotation	0	0	5	6	32	72	90	45	0	27	81	90	81	72	54	32	0	5
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bermuda-Cereal Rye	0	0	5	6	32	72	90	45	23	81	108	108	99	81	45	32	14	36
% DMI	0.0225	0.0225	0.0291	0.0291	0.0291	0.0291	0.032	0.0333	0.035	0.0361	0.0355	0.0349	0.034	0.0333	0.032	0.032	0.032	0.032
			running balage			71.9733								running balage		71.9733		
# DMI/c/d	24.75	24.75	32.01	32.01	32.01	32.01	35.2	36.63	38.5	39.71	39.05	38.39	37.4	36.63	35.2	35.2	35.2	35.2
total surp/def	-40837.5	-43560	-51466	-44135.6448	-41270.5	-19898.1	6590.94	13740.57	22184.48	37657.66	31345.14	30142.65	6060.54	-11545.3	-32220.5	-49636.3	-50591.1	-24609.9
total grass surp/def/c/d	**24.8**	**26.4**	**31.2**	**26.7**	**25.0**	**12.1**	**4.0**	**8.3**	**13.4**	**22.8**	**19.0**	**18.3**	**3.7**	**7.0**	**19.5**	**30.1**	**30.7**	**14.9**
# grass available/cow/day	**0.0**	**0.0**	**0.7**	**1.0**	**5.9**	**17.6**	**33.3**	**38.2**	**44.2**	**51.9**	**49.3**	**48.2**	**34.9**	**25.6**	**13.3**	**5.9**	**3.9**	**17.2**
# Grass Fed/c/d	**0.0**	**0.0**	**0.70**	**1.00**	**5.90**	**17.60**	**29.20**	**32.00**	**32.00**	**33.20**	**32.50**	**31.85**	**30.90**	**25.60**	**13.30**	**5.90**	**3.90**	**17.20**
sudan balage/c/d	19.75	19.75	18.1	10	10	4.4	0	0	0	0	0	0	0	0	0	0	0	1.5
grain c/d	5	5	10	10	10	10	6	4.6	6.5	6.5	6.5	6.5	6.5	8	6	6	6	6
purchased hay c/d	0	0	3.2	11	6.1	0	0	0	0	0	0	0	0	0	0	0	0	0
wrapped hay on farm	0	0	0	0	0	0	0	0	0	0	0	0	0	3	15.9	23.3	25.3	10.5
difference	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Segment of Feed Budget

# cows	110	stocking rate		1.34		12251.8	milk yield
# acres	82						
wt cows	1100		**DROP DOWN MENU**	% farm			
% DMI	0.031	Forage	Perennial Ryegrass	0.378	31.0		
# DM day	34.0	Forage	Fescue w/ high N	0.378	31.0		
grazing efficiency	0.85	Forage	RRCG-Cereal Rye rotation	0.171	14.0		
		Forage	1	0	0.0		
	summer stand-off	Forage	Bermuda-Cereal Rye	0.073	6.0		
					82.0	add forages (doubled cropped only once)	

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Segment of Feed Budget

Growth rates of Forages

DM grass grown per day

	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May
Perennial Ryegrass	0	0	0	0	5	18	45	68	90	90
Fescue w/ high N	0	0	0	0	0	9	36	63	90	99
RRCG-Cereal Rye rotation	0	0	5	6	32	72	90	45	0	27
1	0	0	0	0	0	0	0	0	0	0
Bermuda-Cereal Rye	0	0	5	6	32	72	90	45	23	81
% DMI	0.0225	0.0225	0.0291	0.0291	0.0291	0.0291	0.032	0.0333	0.035	0.0361
				running balage		71.9733				
# DMI/c/d	24.75	24.75	32.01	32.01	32.01	32.01	35.2	36.63	38.5	39.71

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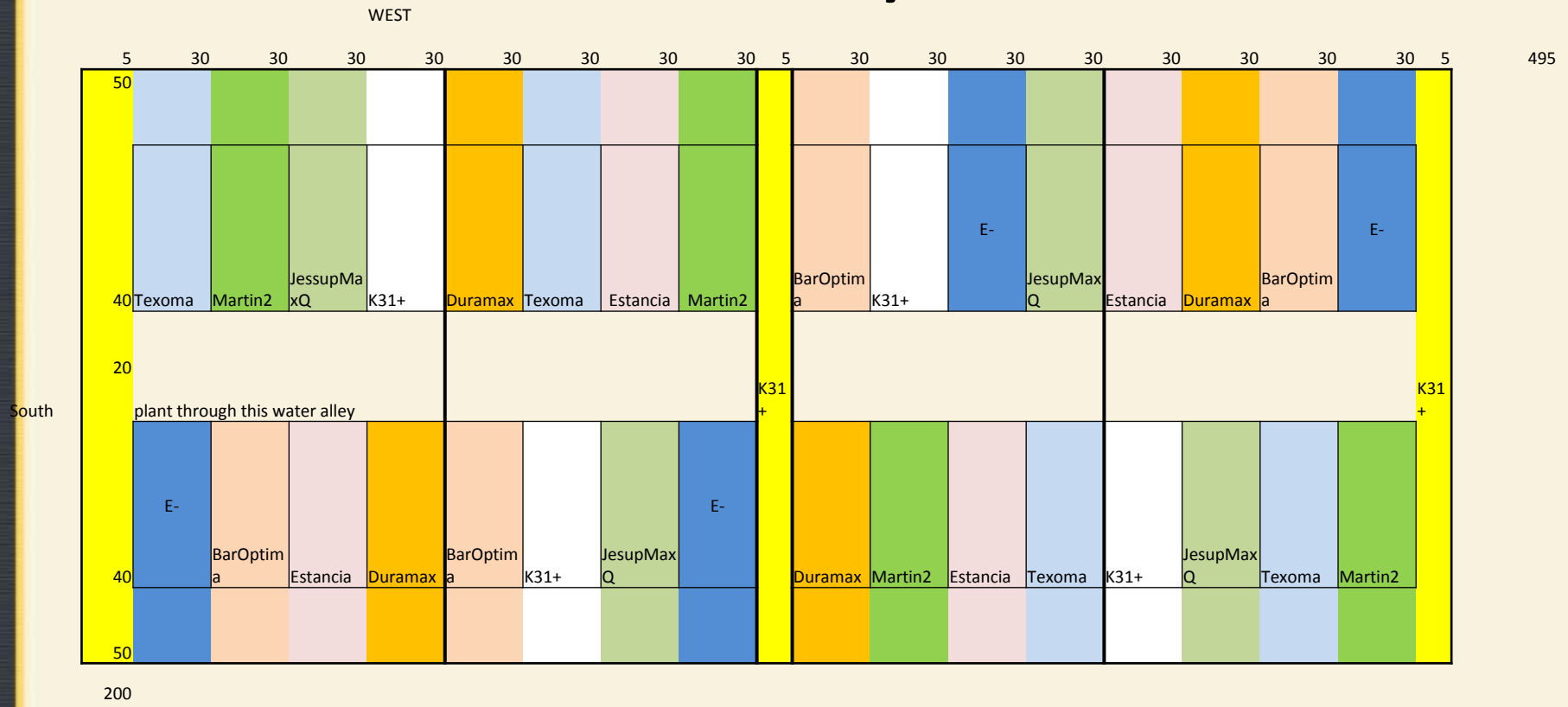
Fescue Variety Trial-2013



Jesup w MaxQ
Texoma w MaxQ
BarOptima w E34+
Estancia w Arkshield
Duramax w Armor
Martin2
K31 w E++
K31 nil E

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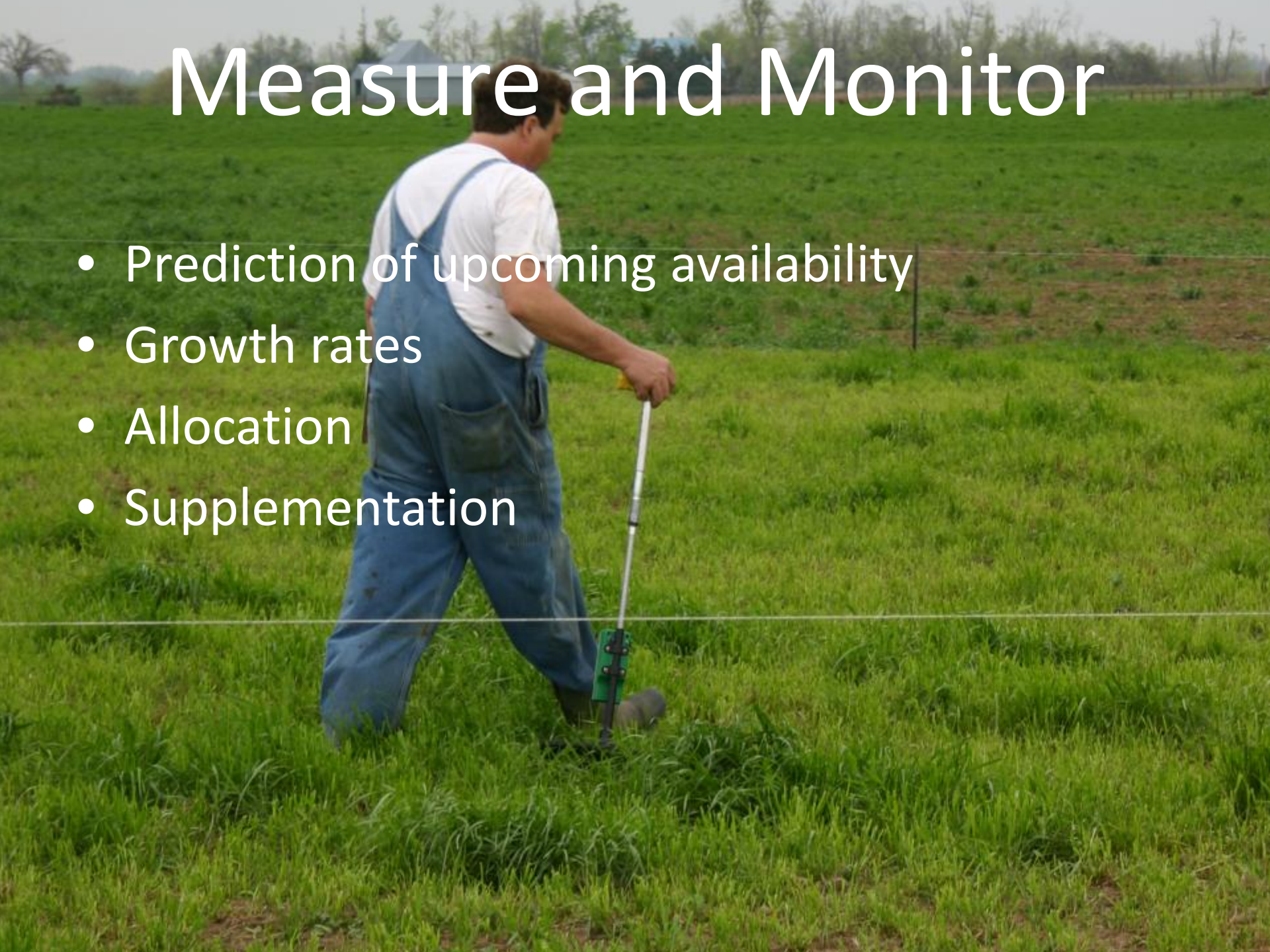
Forage Systems

- Utilization
- How you graze
- Forage system
- Measure, Monitor, Manage

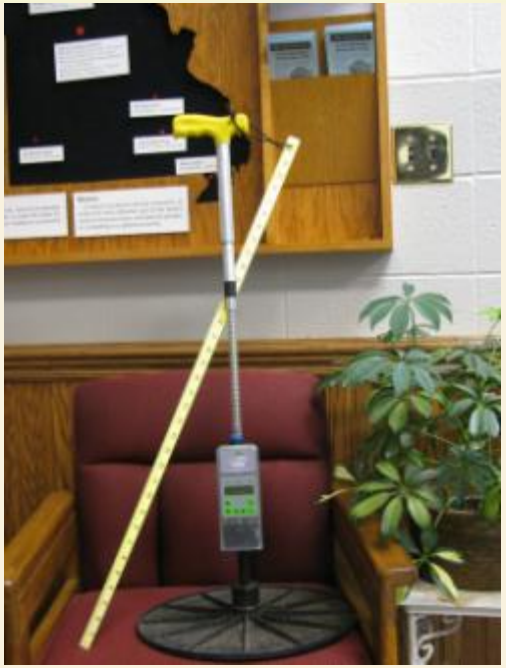
Measure and Monitor



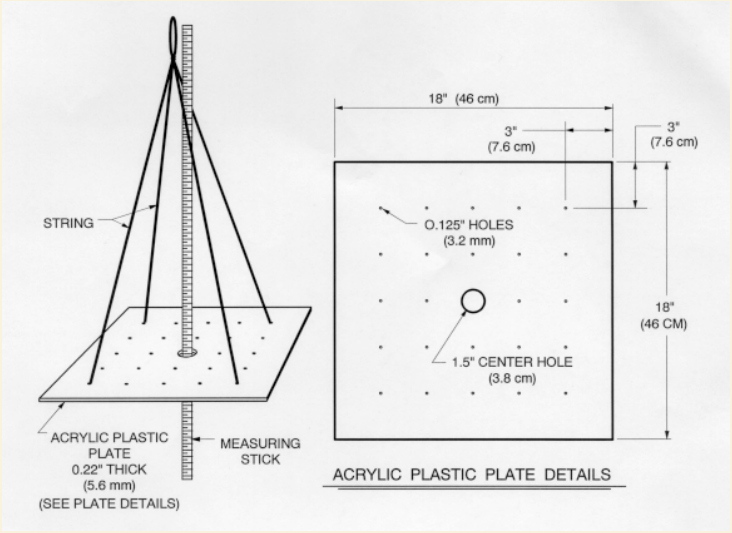
- Prediction of upcoming availability
- Growth rates
- Allocation
- Supplementation

Tools to Measure Pasture Dry Matter Yields

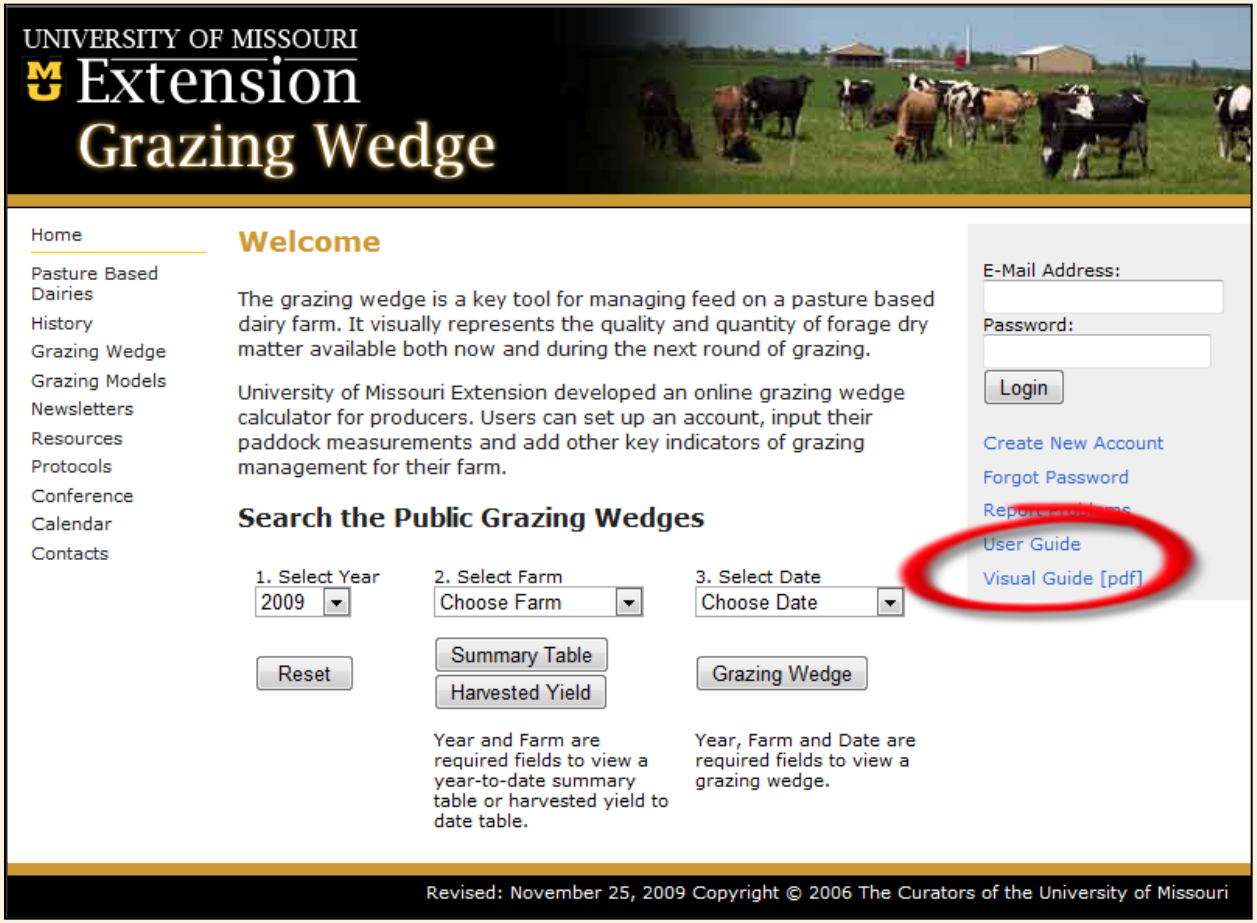
- Rising Platemeter
- Yard stick or forage stick
- CDax rapid pasture measure
- Feed Reader
- Visual appraisal



Measuring tools



Pasture Monitoring Website



http://plantsci.missouri.edu/grazingwedge/

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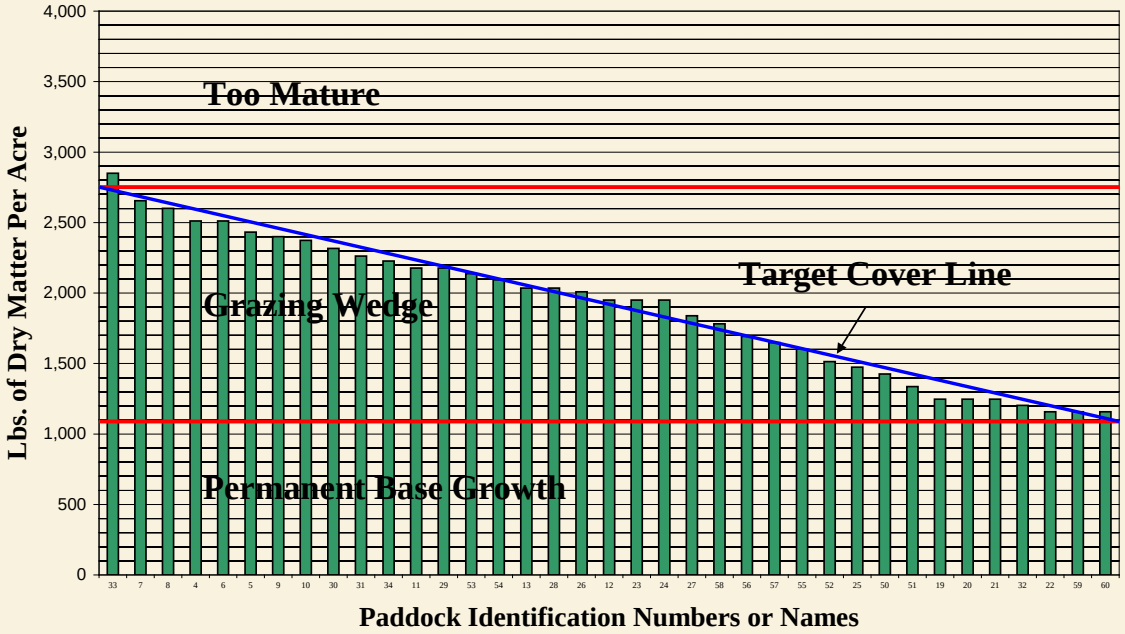
Grazing Wedge at Missouri Farm #7



Summary of KEY INDICATORS for Grazing Management and Animal Performance		
Estimated growth rate (lbs of dry matter accumulation per acre per day)		**57**
Cover when cows turned onto a paddock (lbs DM/Acre)	Actual: **2,820**	Ideal: **2,750**
Cover when cows removed from paddock (lbs DM/Acre)	Actual: **1,158**	Ideal: **1,100**
Average pasture cover (lbs DM/Acre)	Actual: **1,902**	Ideal: **1,925**
Rotation length current (days till cows return to given paddock)		**30**
Milk production (lbs per day)		**51**
Lbs of hay currently being fed (per cow per day)		**0**
Lbs of grain currently being fed (per cow per day)		**14**

Critical issues right now

Rain 6/17/06 .10, 6/22/06 .60, 6/25/06 .30

Rotation is 30 days but if we receive some rain in the near future we will speed back up.

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Definitions and Concepts

- Growth Rate
  - Calculation of forage growth on a daily basis from time point to time point averaged across all growing paddocks
  - Usually measured every 7-10 days
    - May be more often in spring with rapid growth rates or changing weather patterns
  - May be slightly longer interval during slow growing periods and consistent weather (summer drought)
- Used in conjunction w/ average cover to determine upcoming feeding and fertilization strategies

Definitions and Concepts

- Feed Demand
  - Amount of pasture forage needed per cow per day above other supplemental feeding (grain, silage, hay)
  - Example:
    - Stocking rate of 1.25 cows/acre
    - Cow requirement of 38# DM/day
    - Feeding 8# grain and 3# DM corn silage /cow/day
    - Feed Demand of pasture forage is 33.75#
    - (38-(8+3)=27)*1.25=33.75

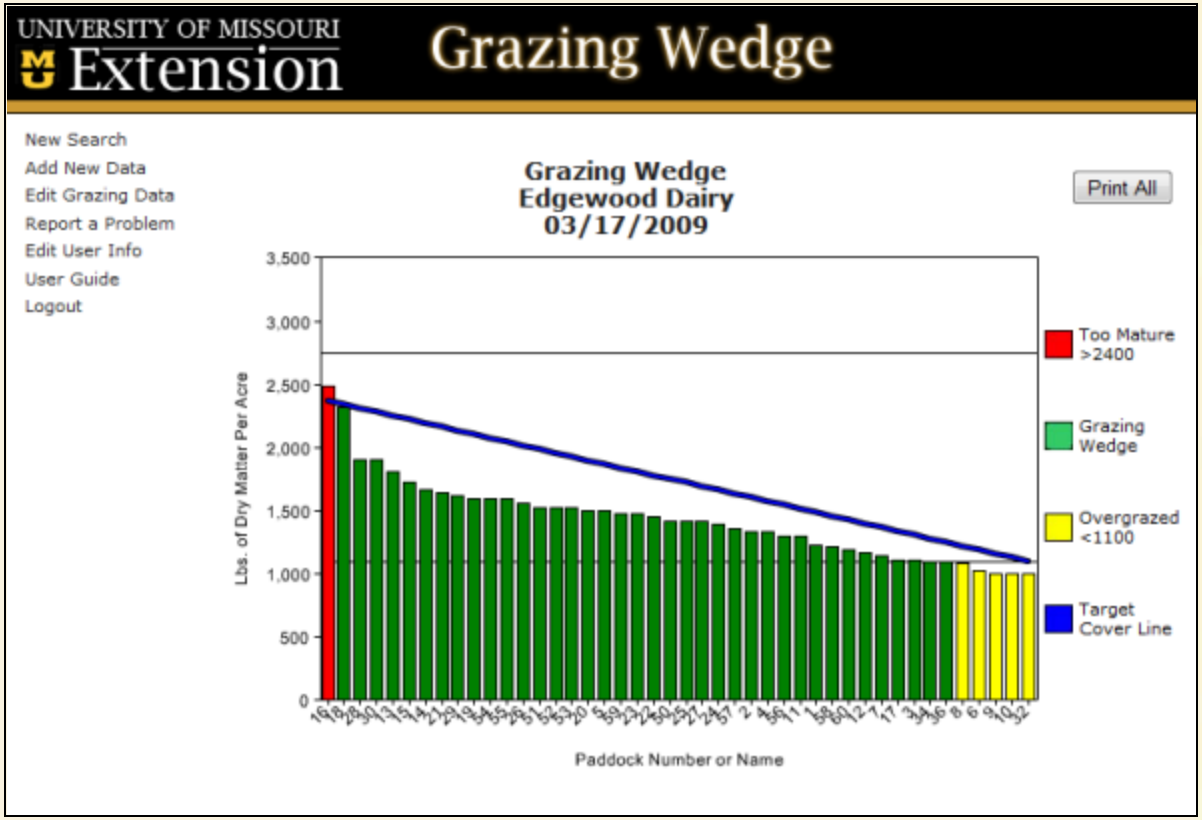
Examining “Wedges”

Growth rate is limiting factor here

At current usage, forage will run out if growth rate does not improve

Options:

- Feed more supplements
- Decrease stocking rate
- Take some condition off of livestock
- Fertilize to improve growth rate



Growth rate is 33 lb/a/day

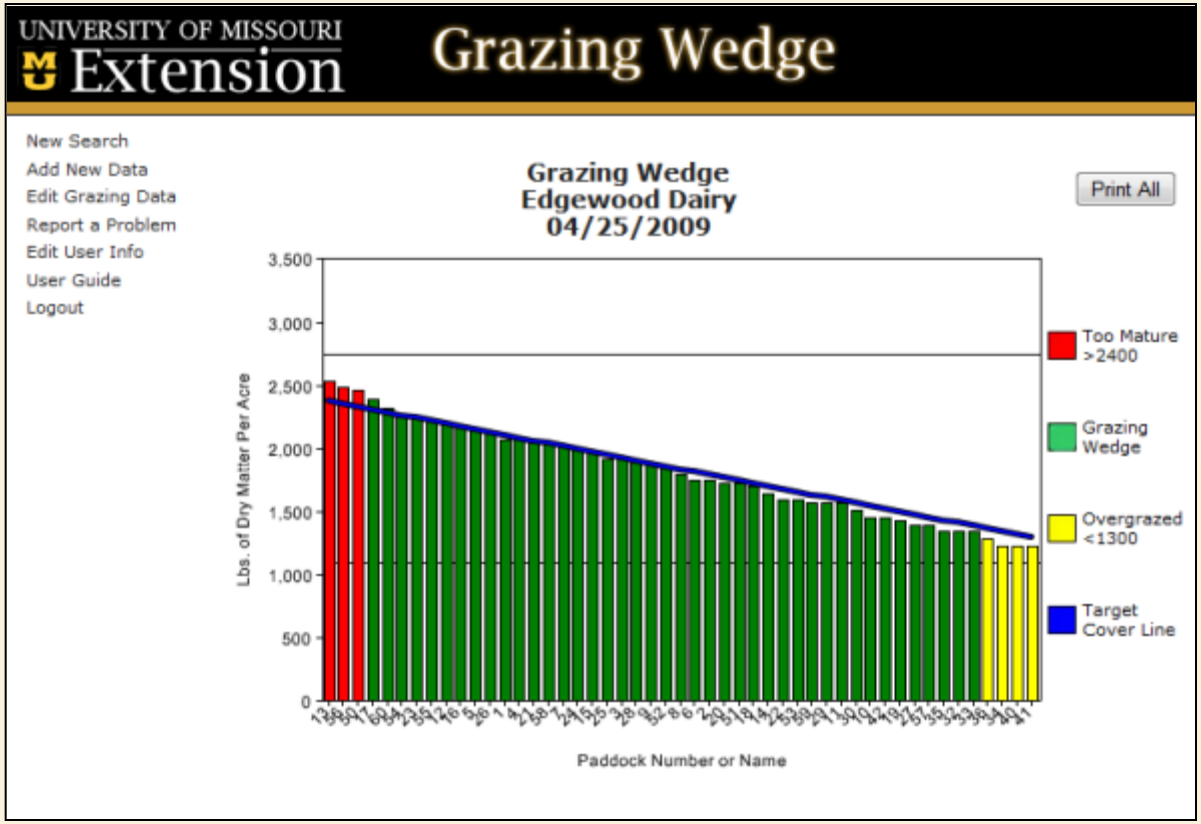
What about this one?

Nearly perfect balance – a few paddocks getting ahead

At current usage, forage growth rate is nearly ideal

Options:

- Not much to do, except harvest a few paddocks
- Beware that growth rates change quickly sometimes – don't get complacent



Growth rate is 61 lb/a/day

Forage Systems

- Utilization
- How you graze
- Forage system
- Measure, Monitor, Manage
- **Discussion Groups**

Keys to Successful Discussion Groups

- Collective learning – learn from each other
- Share experiences, information, data
- All members have something to offer
- All members can learn something

Role of Facilitator

- Facilitate discussion
  - don’t lecture
  - Ask questions to stimulate discussion
  - Don’t dominate discussion
- Maintain order – don’t let “mini discussions” disrupt the group
- Share research
- Stay away from “I think or I believe”

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What's in it for the producer?

- Efficient way to transfer knowledge in small group setting
- Forms a partnership with producers
- Opportunity to learn from top producers
- Create "expert producers" that can serve as mentors

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Keys to Success….

Profit Motivated Grazers

- Willing to manage for more profit.
- Willing to adapt, learn, and seek new information and models of operation.
- Characterized by a positive outlook on the industry and its future.
- Looks at more than just cash-flow but return on investment or assets

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