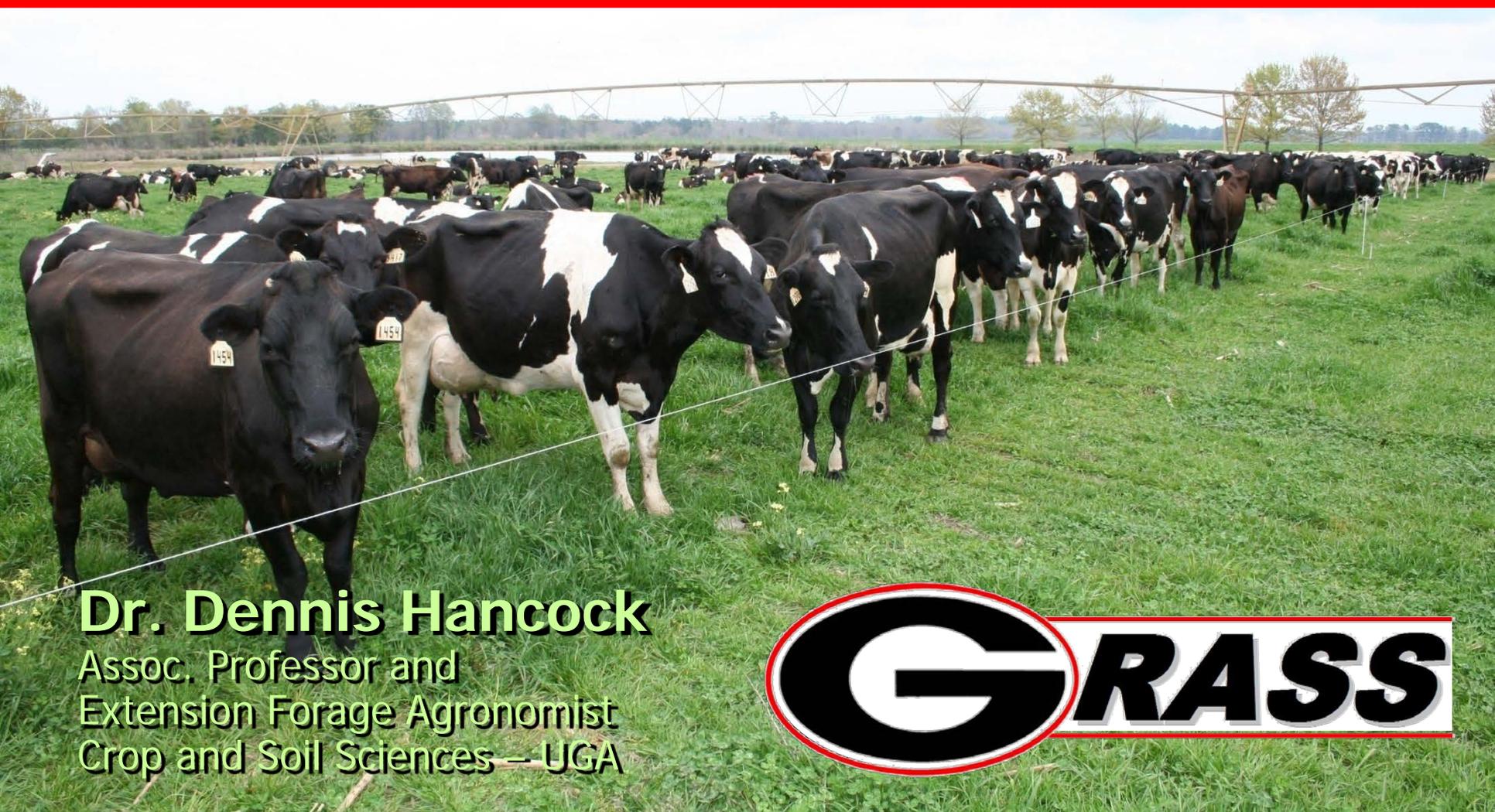


Forage systems for warm season dairying



Dr. Dennis Hancock

Assoc. Professor and
Extension Forage Agronomist
Crop and Soil Sciences – UGA

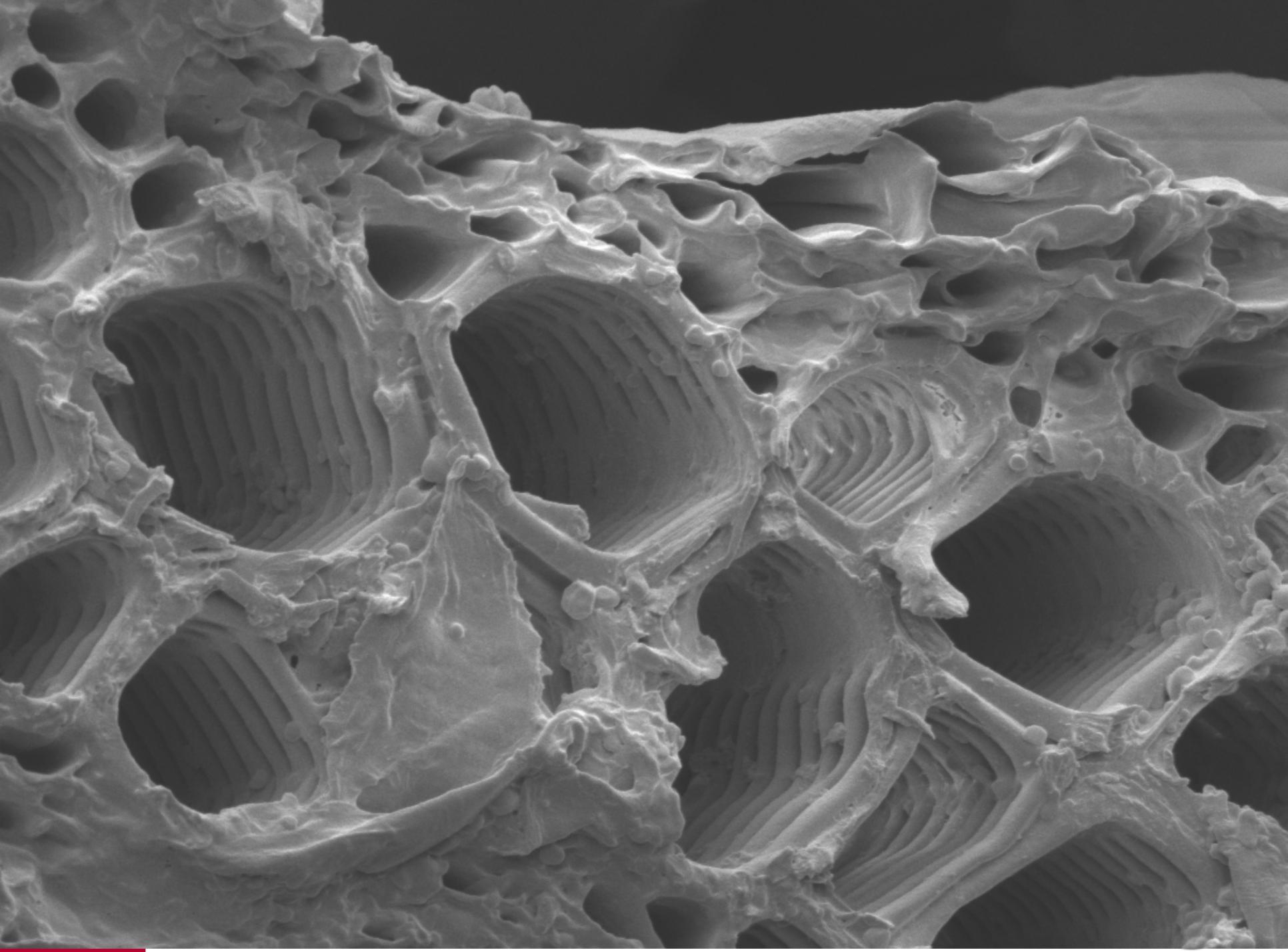


Forage Yield of Selected Forage Species in the South

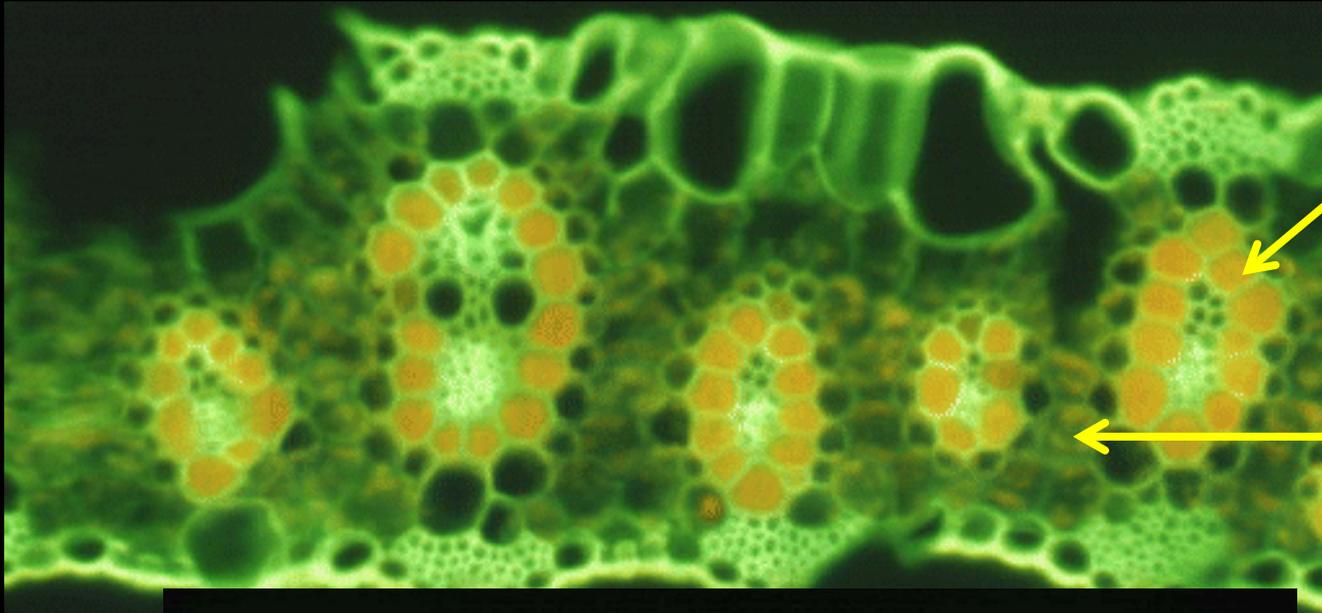
Forage Crop	Typical Yield (lbs DM/acre)
Corn silage	20,000-32,000 ←
Tropical corn silage	5,000-22,000
Ann. Ryegrass	8,000-14,000 ←
Oats	6,000-11,000
Triticale	3,000-7,000
Bermudagrass, Coastal	12,000-15,000
Bermudagrass, Tifton 85	14,000-22,000 ←
Alfalfa	9,000-16,000 ←
Forage Sorghum	10,000-16,000
Sorghum x Sudangrass (SxS)	9,000-24,000 ←
Pearl Millet	8,000-13,000

Differences in Forage Quality

Forage	CP	NDF	NDFD	NFC
	------(%)-----			
Corn silage	8	42	58	42.5
Forage Sorghum	8	48	58	37.0
BMR Forage Sorghum	8	48	65	37.0
Sorghum-Sudan (SxS)	10	67	58	12.0
BMR SxS	10	67	65	14.0
Alfalfa	20	40	48	27.5
Annual ryegrass	20	52	65	12.5
Rye	20	57	60	12.5
Bermudagrass, Tifton 85	12	69	60	<10



Warm season grass



Bundle Sheath Cells

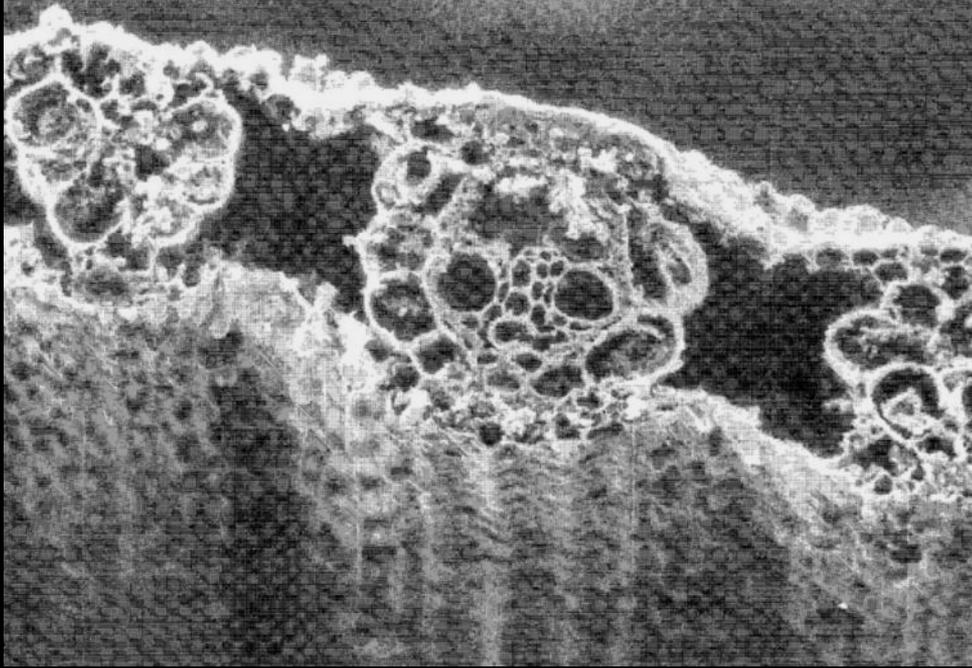
Mesophyll Cells



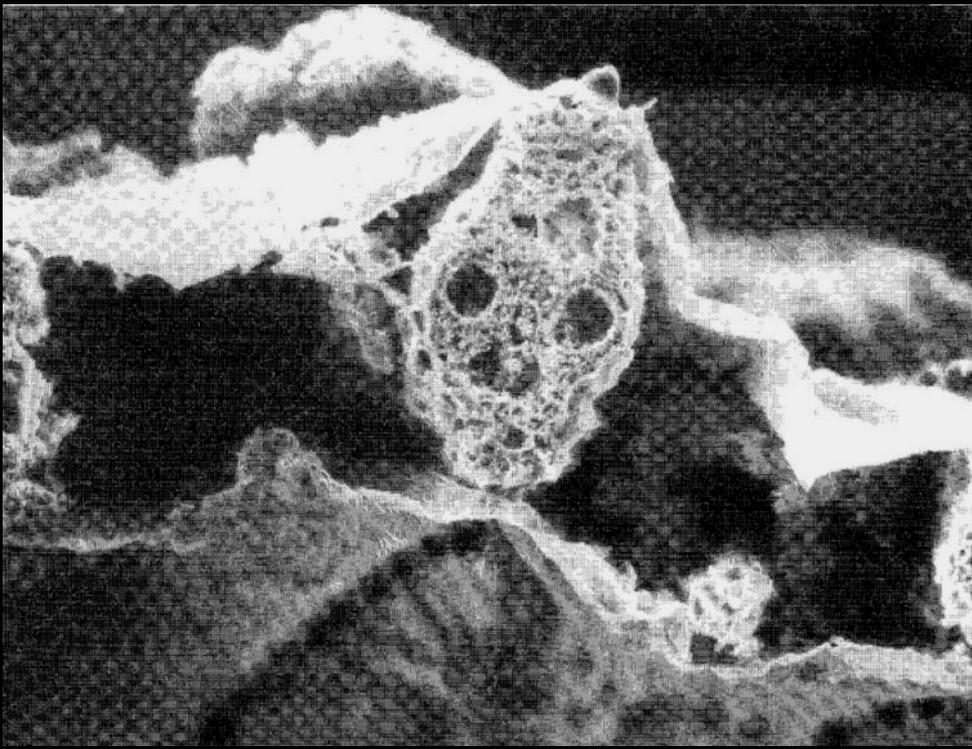
Vascular Tissue

Mesophyll Cells

Cool season grass

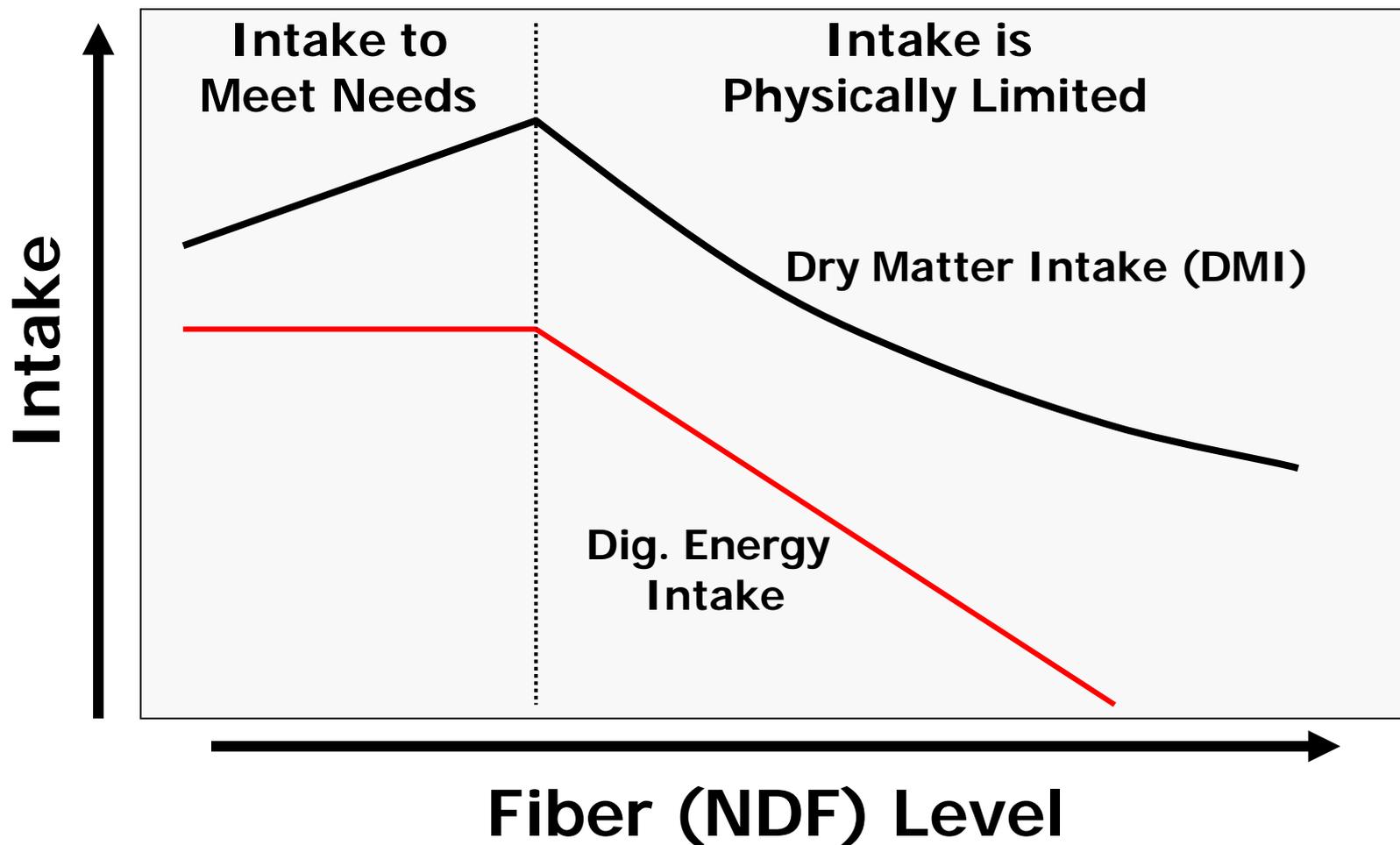


**Bermudagrass leaf
after incubation in
rumen fluid for 48 hr**



**Tall fescue leaf after
incubation in rumen
fluid for 48 hr**

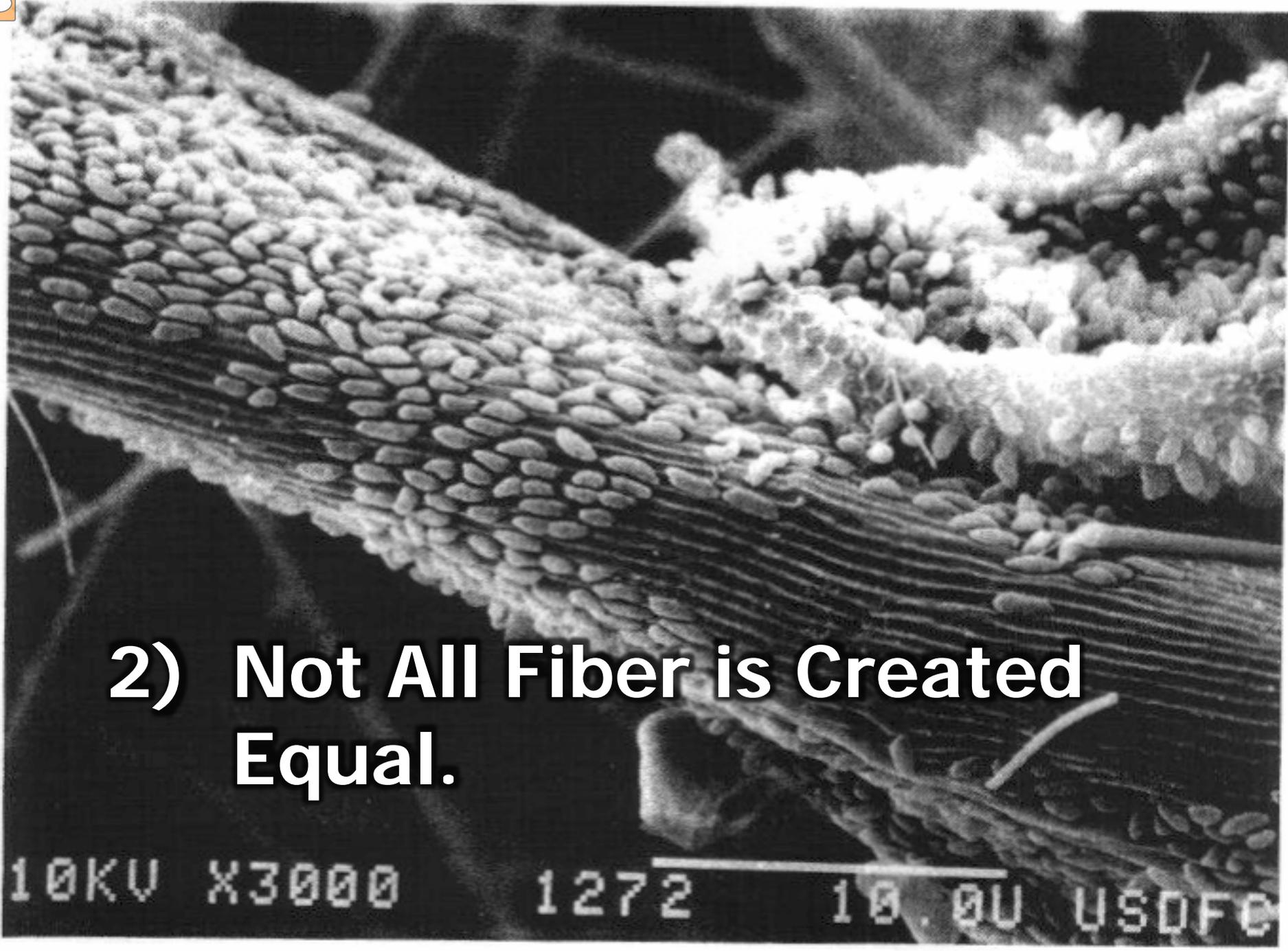
The Relationship between Fiber (NDF) and Dry Matter Intake (DMI)





1) The Fiber Digestion Environment is Dynamic.

10KV X3000 1272 10.0U USDFC



2) Not All Fiber is Created Equal.

10KV X3000 1272 10.0U USDFC

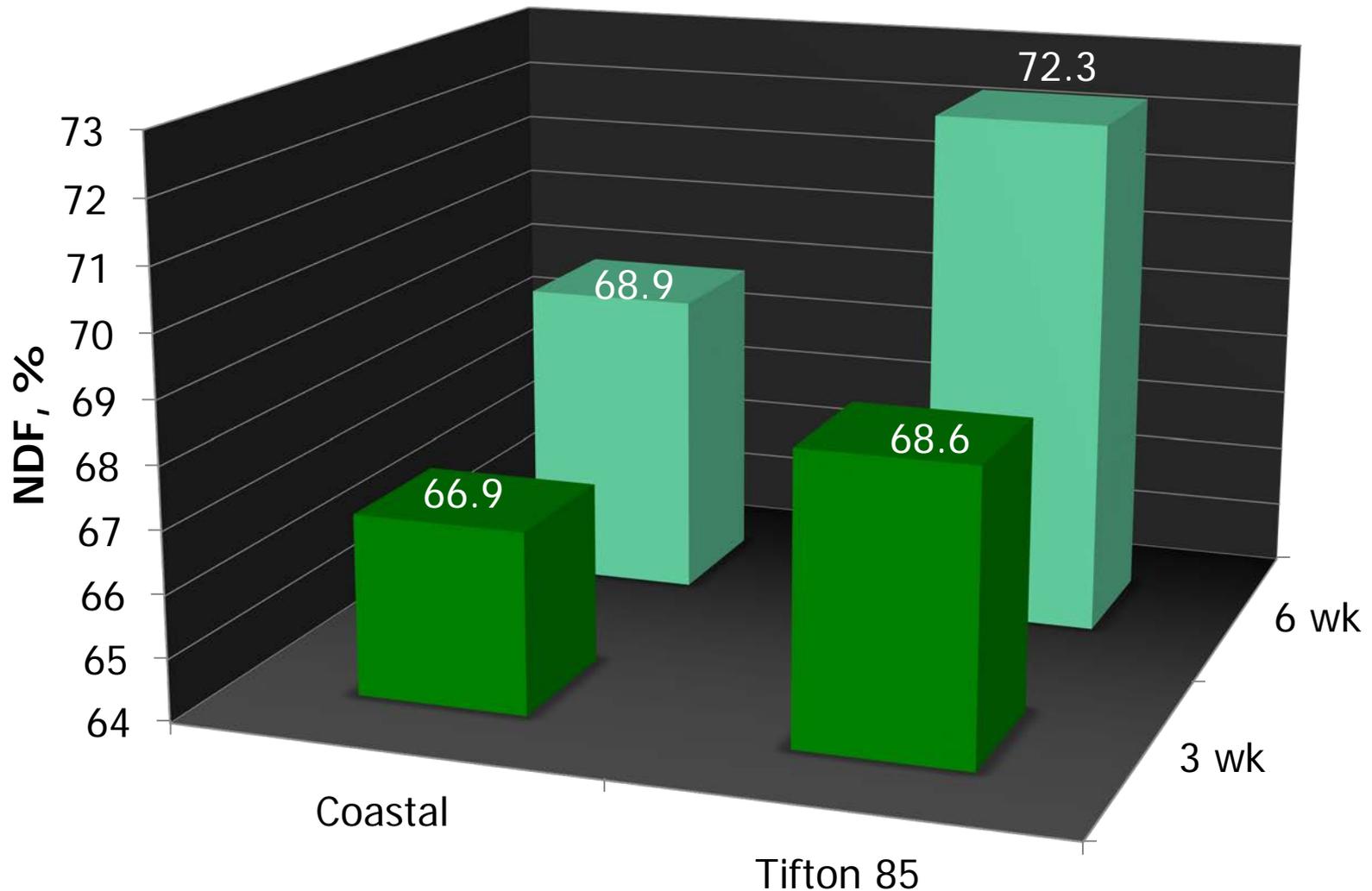


Coastal



Tifton 85

What is the difference in Coastal and Tifton 85?



Adapted from Mandebvu et al. (1999).

Tifton 85 Hay (BH) as a Substitute for Corn Silage (CS) in Holstein Dairy Cows (~50 DIM)¹

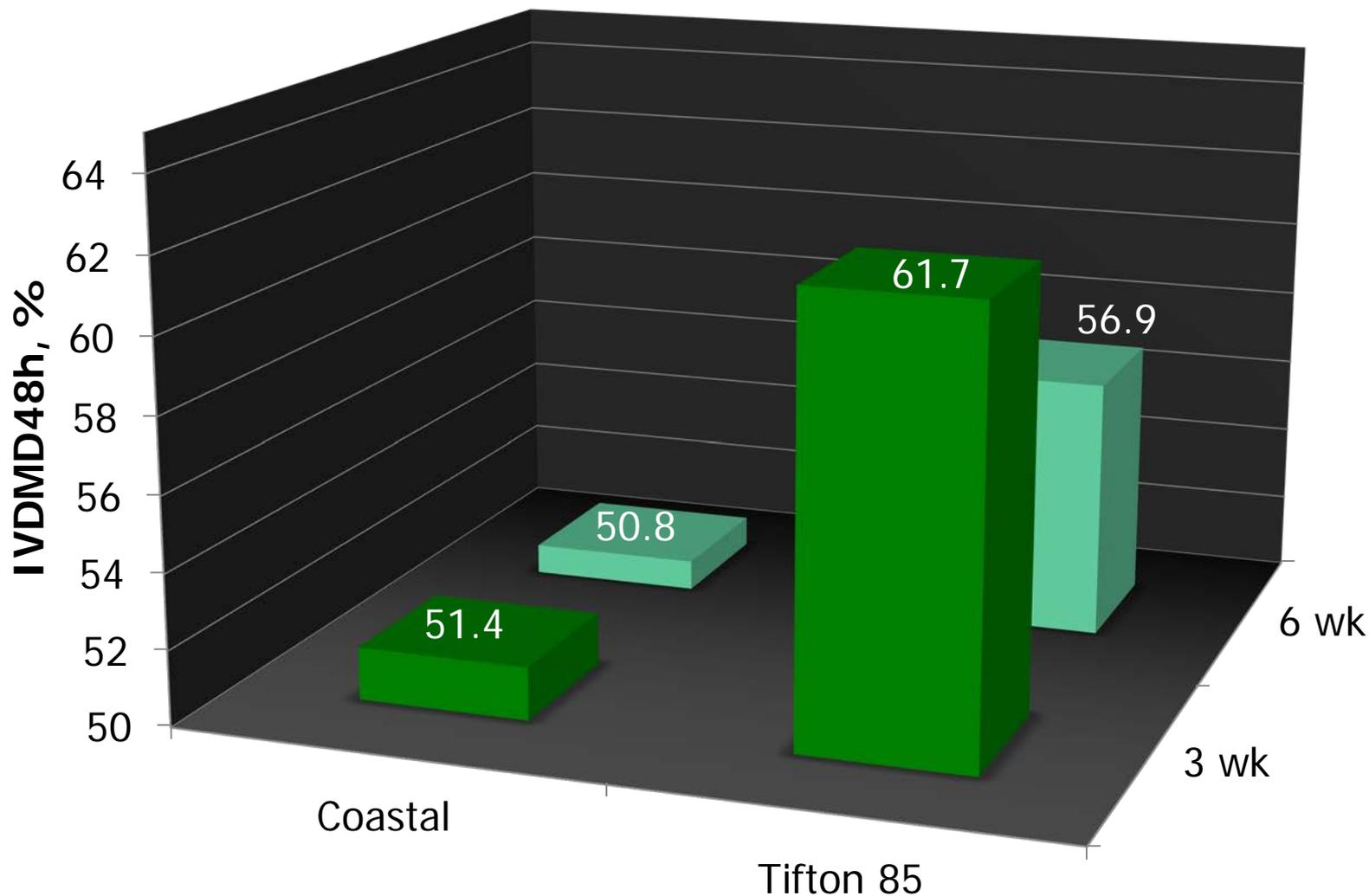
Item	<u>Control</u>		<u>T85 Hay²</u>	
	45CS/0BH	30CS/15BH	15CS/30BH	
DMI, lbs/cow/d	50.4 a	48.6 b	48.4 b	
DMI, % of BW/d	4.29 a	4.16 b	4.19 b	
Milk Yield, lbs/cow/d	75.0 a	72.6 ab	70.0 b	
Fat, %	3.33 b	3.73 a	3.72 a	
3.5% FCM, lbs/cow/d	73.9 ab	74.6 a	73.7 b	
<i>3.5% FCM:DMI³</i>	<i>1.47</i>	<i>1.53</i>	<i>1.52</i>	

¹ Adapted from West et al., 1997. J. Dairy Sci. 80:1656–1665.

² The 15% and 30% BH diets contained 14% and 28% more ground corn and 70 and 84% less soybean meal, respectively than the CS diet.

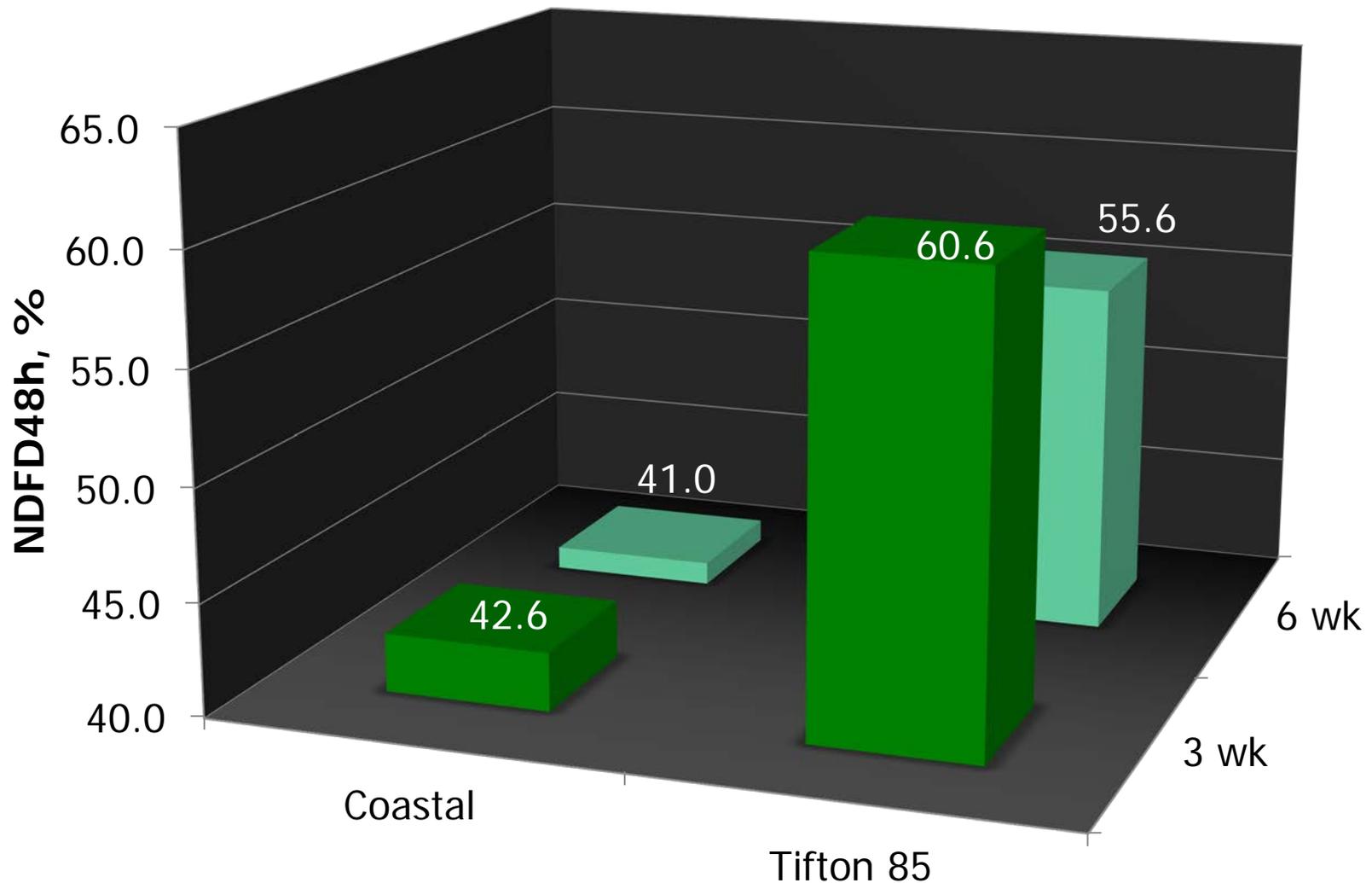
³ Calculated from reported values.

What is the difference in Coastal and Tifton 85?



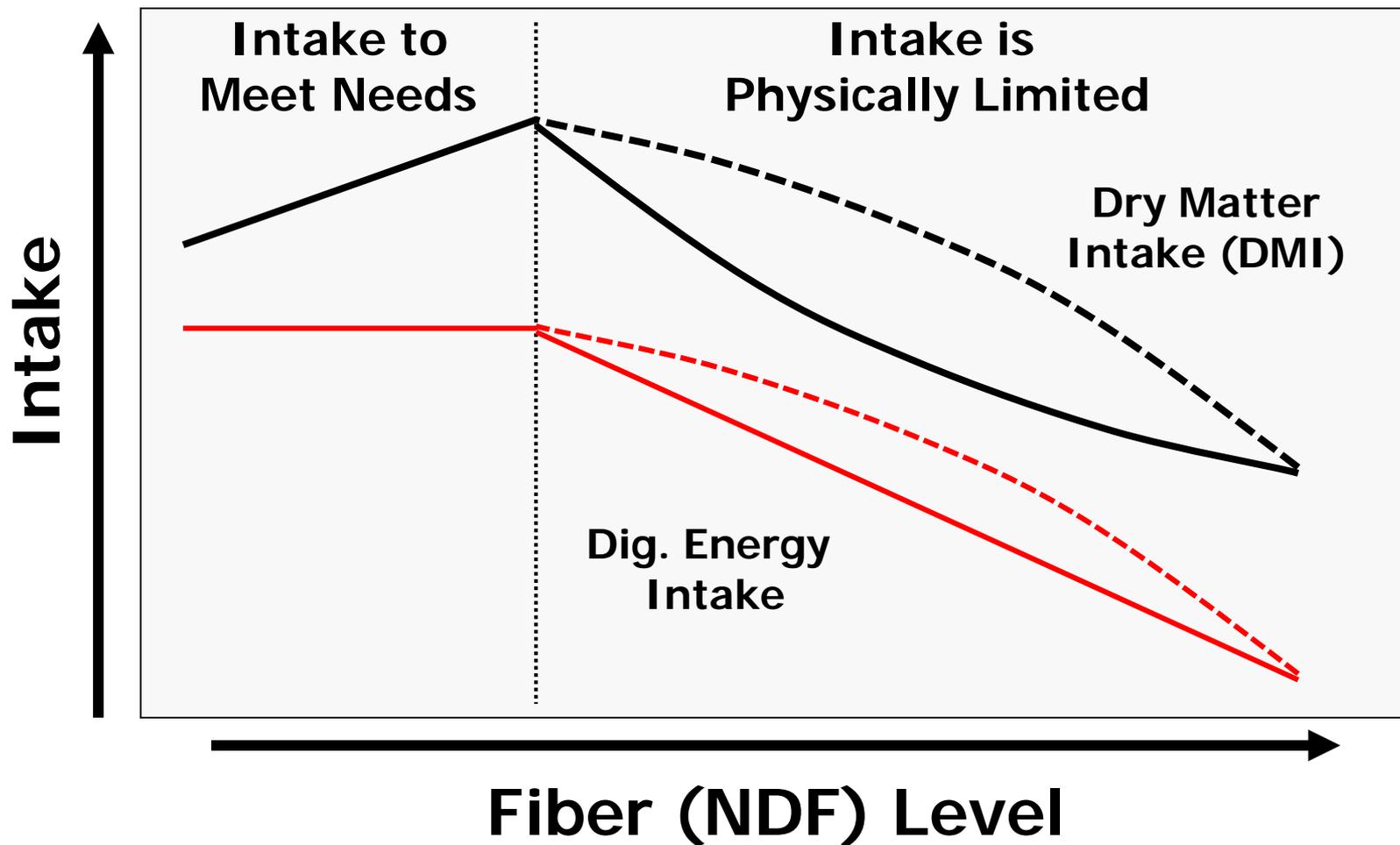
Adapted from Mandevvu et al. (1999).

What is the difference in Coastal and Tifton 85?



Adapted from Mandebvu et al. (1999).

The Relationship between Fiber (NDF) and Dry Matter Intake (DMI)



Feeding 10, 17.5, & 25% T85 Baleage to Holsteins (221 DIM) When Balancing for NDF¹

Item	Proportion T85 in diet			SE	<i>P</i>
	10	17.5	25		TRT
DMI, lbs/cow/d	45.3	46.2	48.0	1.98	0.4377
BW change, lbs	40.0	21.1	30.4	11.0	0.2314
BCS change	-0.02	-0.04	-0.08	0.04	0.4856
Milk Yield, lbs/cow/d	73.9	73.9	73.9	1.98	0.9981
Fat, %	3.60	3.64	3.75	0.09	0.5929
ECM, lbs/cow/d	74.8	75.0	75.7	0.20	0.6297
ECM:DMI	1.65	1.63	1.58	0.05	0.7255
MUN, mg/dl	11.0	11.9	11.4	0.30	0.0060

¹ Bernard and Mullis, 2012 UGA ADS Preliminary Report.

TAKE HOME NOTES

- **T85 hay/baleage fed at 10-15%** of the diet improves components and does NOT significantly lower milk yield, as long as total energy & protein is balanced to need.
- **Rates up to 25% are possible**, if the diet is balanced for NDF as well as total energy and CP.

Water Use in Forage Crops

Crop	Water Used			Reference
	lb H ₂ O/ lb DM	Acre-inches H ₂ O/ton DM	% of Alfalfa	
Alfalfa (C3)	844	7.5	100	Bennett and Doss, 1963
Sudangrass (C4)	380	3.4	45	Martin et al., 1973
Corn (C4)	372	3.3	44	Martin et al., 1976
Sorghum (C4)	271	2.4	32	Martin et al., 1976
Coastal Bermuda (C4)	265	2.3	31	Doss et al., 1962



What About Forage Sorghum and Other Members of the Sorghum Family?

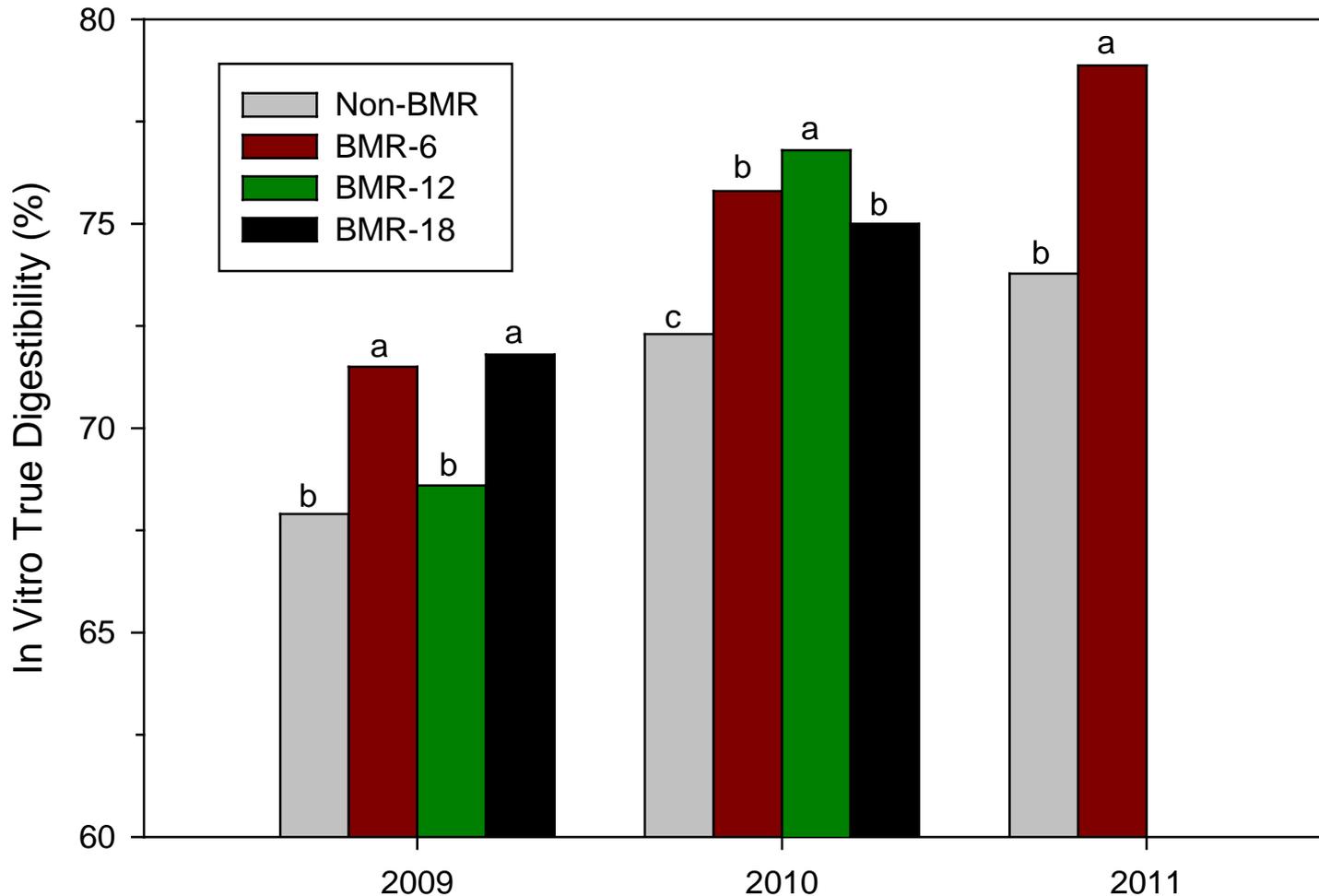


WHAT ABOUT BROWN MID-RIB (BMR) VARIETIES?

**BMR Trait:
Less lignin, more digestibility**

Impact of BMR Gene

Summer Annual Variety Trials-2009 to 11



Using BMR Sorghum x Sudan (bmrSxS) as a Substitute for Corn Silage (CS) in a Diet for Holstein Milk Cows (120 DIM)¹

Item	<u>bmrSS²</u>		<u>CS</u>	
	35%	45%	35%	45%
DMI, % of BW/d	3.06 b	2.71 c	3.62 a	3.58 a
BW change, lbs/21 d	39.2 a	26.2 a	2.9 b	18.3 ab
BCS change, unit/21 d	0.04	0.02	0.13	0.1
Milk Yield, lbs/cow/d	69.0 ab	63.7 b	72.1 a	68.1 ab
Fat, %	3.43	3.43	3.15	3.15
3.5% FCM, lbs/cow/d	67.0	62.6	67.0	64.1
3.5% FCM:DMI	1.52 a	1.62 a	1.32 b	1.26 b

¹ Dann et al., 2008. J. Dairy Sci. 91:663–672

² The 35% and 45% bmrSS diets contained 64% and 143% more ground corn than the corresponding CS diets, respectively.

Dairy Cow Performance

Study	Normal	BMR-6	BMR-12	BMR-18	Corn
	lbs fat corrected milk/day				
Browning and Lusk, 1966	35.7a				35.5a
Lusk et al., 1984					
Experiment I			49.2a		47.8b
Experiment II			54.5a		52.2a
Grant et al., 1995	39.5b	57.8a			58.6a
Oliver et al., 2004	64.2b	74.3a		68.8ab	73.4a
Aydin et al., 1999					
Experiment I	45.6c	52.2b			63.9a
Experiment II	69.2b	74.5a			71.4ab

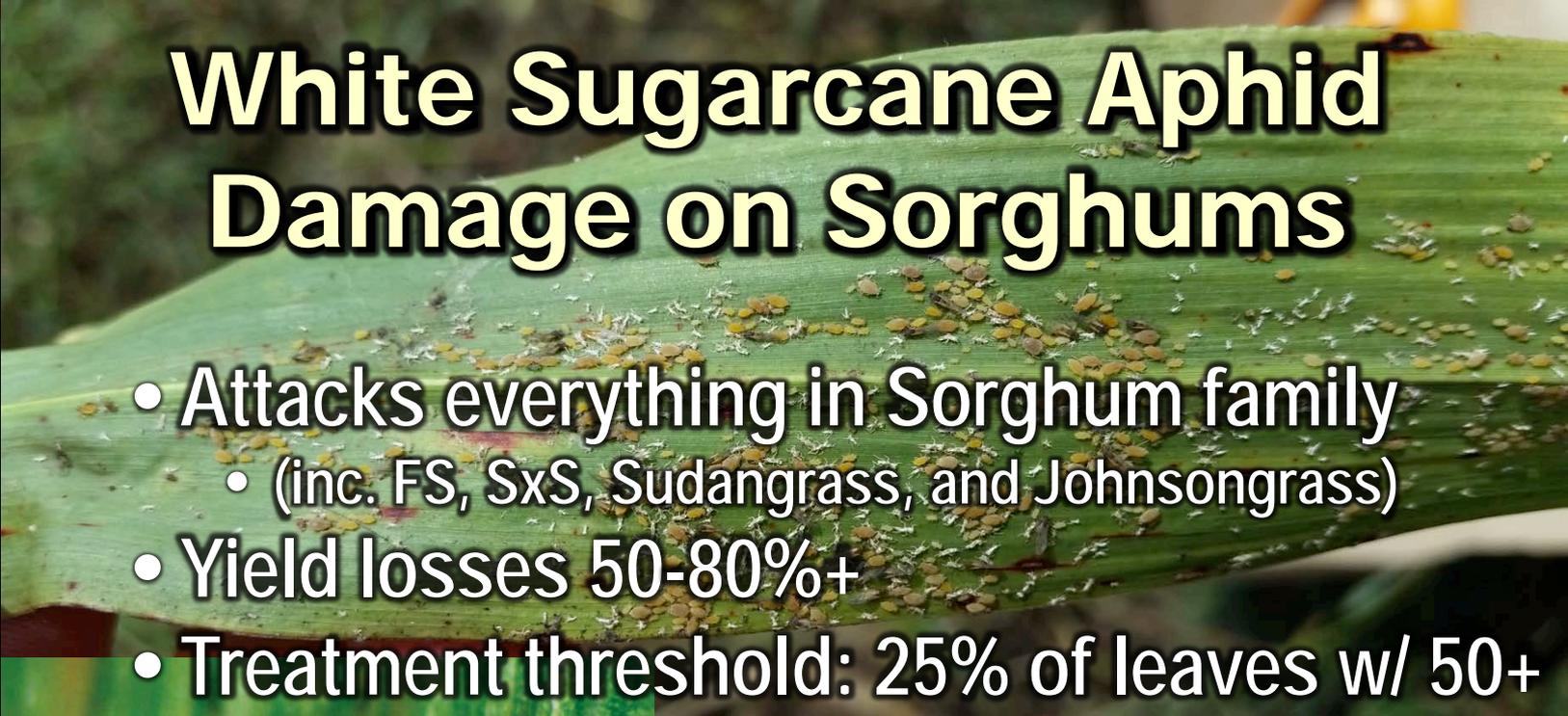
Contreras-Govea, F.E., M.A. Marsalis, M.A., L.M. Lauriault, and B.W. Bean. 2010. Forage sorghum nutritive value: A review. Online. Forage and Grazinglands doi: 10.1094/FG-2010-0125-01-RV.

TAKE HOME NOTES

- **bmrSxS (especially the bmr-6 variants) can sustain milk yields and improve components (and weight gains) compared to CS, as long as energy and protein are balanced to need.**
- **Blending, rather than complete replacement may be best in TMR.**

White Sugarcane Aphid Damage on Sorghums

- Attacks everything in Sorghum family
 - (inc. FS, SxS, Sudangrass, and Johnsongrass)
- Yield losses 50-80%+
- Treatment threshold: 25% of leaves w/ 50+ aphids/leaf in pre-boot stage and beyond



White Sugarcane Aphid Damage on Sorghums



Insecticide Options:

- Sivanto (*flupyradifurone*) labeled in some states
 - Rate of 4.0-7.0 oz./acre
- Section 18 label (GA) for Transform WG (*sulfoxaflor*)
 - Rate of 1.0-1.5 oz/acre is about 90% effective
- Pyrethroids are not recommended. Can kill beneficials and cause SCA pop to flare.

A wide-angle photograph of a lush green alfalfa field. The plants are dense and vibrant green, filling most of the frame. In the background, a thin line of trees and a few white buildings are visible under a bright, overcast sky. The text "SO WHY NOT ALFALFA?" is superimposed in large, bold, white letters with a black outline across the upper portion of the image.

SO WHY NOT ALFALFA?



Lowndes County, GA

Alfalfa Hay (AH) as a Substitute for Corn Silage (CS) in Holstein Dairy Cows (~50 DIM)¹

Item	<u>Control</u>		<u>Alfalfa Hay²</u>	
	45CS/0AH	30CS/15AH	15CS/30AH	
DMI, lbs/cow/d	50.4	49.5	49.5	
DMI, % of BW/d	4.29	4.38	4.27	
Milk Yield, lbs/cow/d				
Fat, %				
3.5% FCM, lbs/cow/d				
<i>3.5% FCM:DMI³</i>				

¹ Adapted from West et al., 1997. J. Dairy Sci. 80:1656–1665.

² The 15% and 30% AH diets contained 14% and 28% more ground corn and 70 and 84% less soybean meal, respectively than the CS diet.

³ Calculated from reported values.

TAKE HOME NOTES

Alfalfa can be used effectively as an alt. to CS and we do have an opportunity to grow alfalfa with bermudagrass.

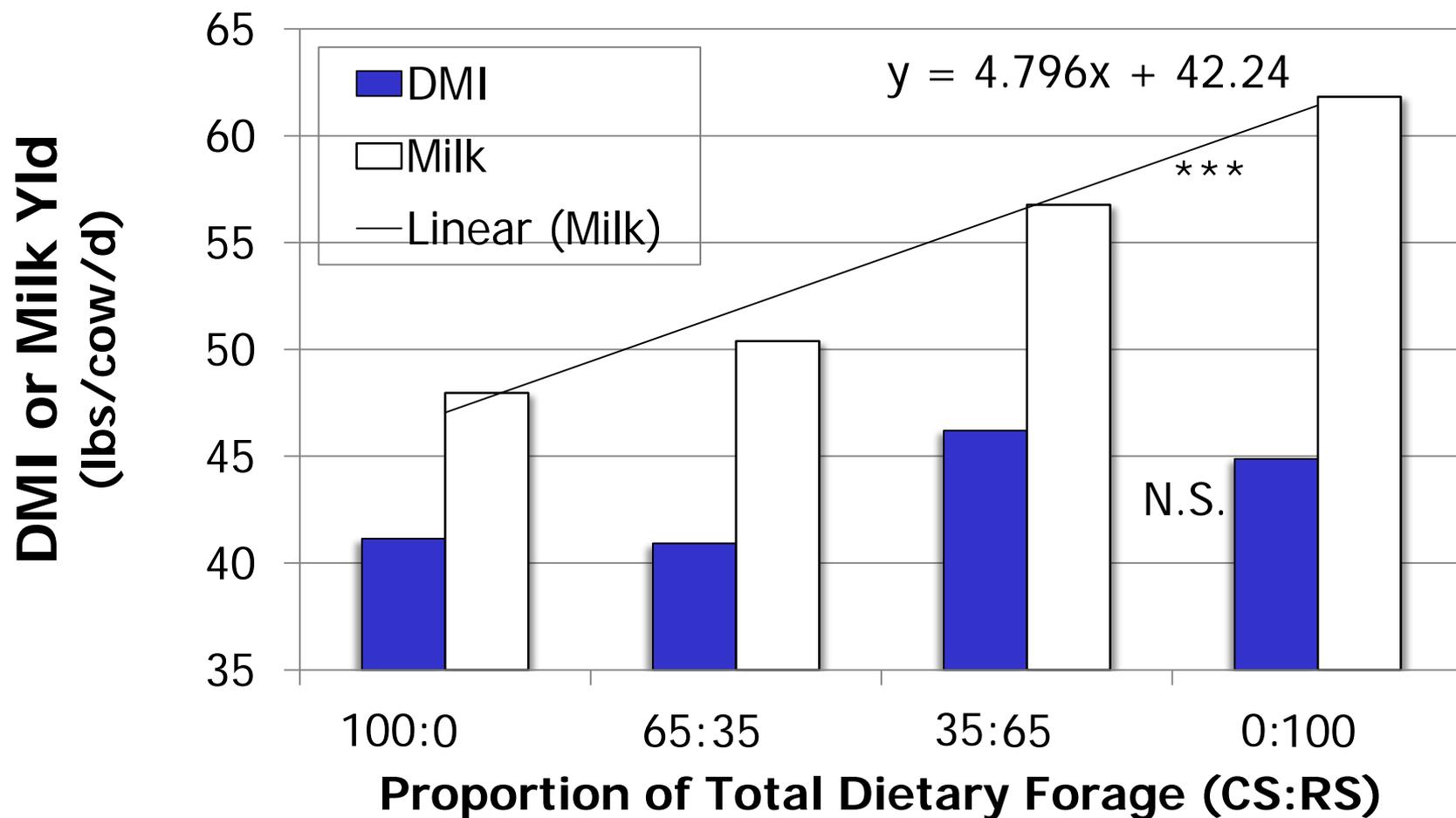
Focus on Winter Annuals



Potential to Reduce Costs with High Quality Grasses?



Effect of Replacing Corn Silage with Annual Ryegrass Silage for Holstein Cows (~310 DIM)¹



TAKE HOME NOTES

Annual ryegrass can improve milk yield and components as an alternative to CS.

It's high quality fiber likely stimulates/improves ruminal starch digestion.

Summary:

- There are many forage options for dairying in warmer climates
 - Forages there are far better than their reputation
- Long growing season, high rainfall, and irrigation potential are a great advantage
 - Water use efficiency is a major concern.
- Alternatives to corn silage have a fit
- Focus should be on winter annuals and alfalfa

Questions?



www.georgiaforages.com

MS and PhD Assistantship available. Please contact Dr. Dennis Hancock at dhancock@uga.edu or 706-542-1529 for details