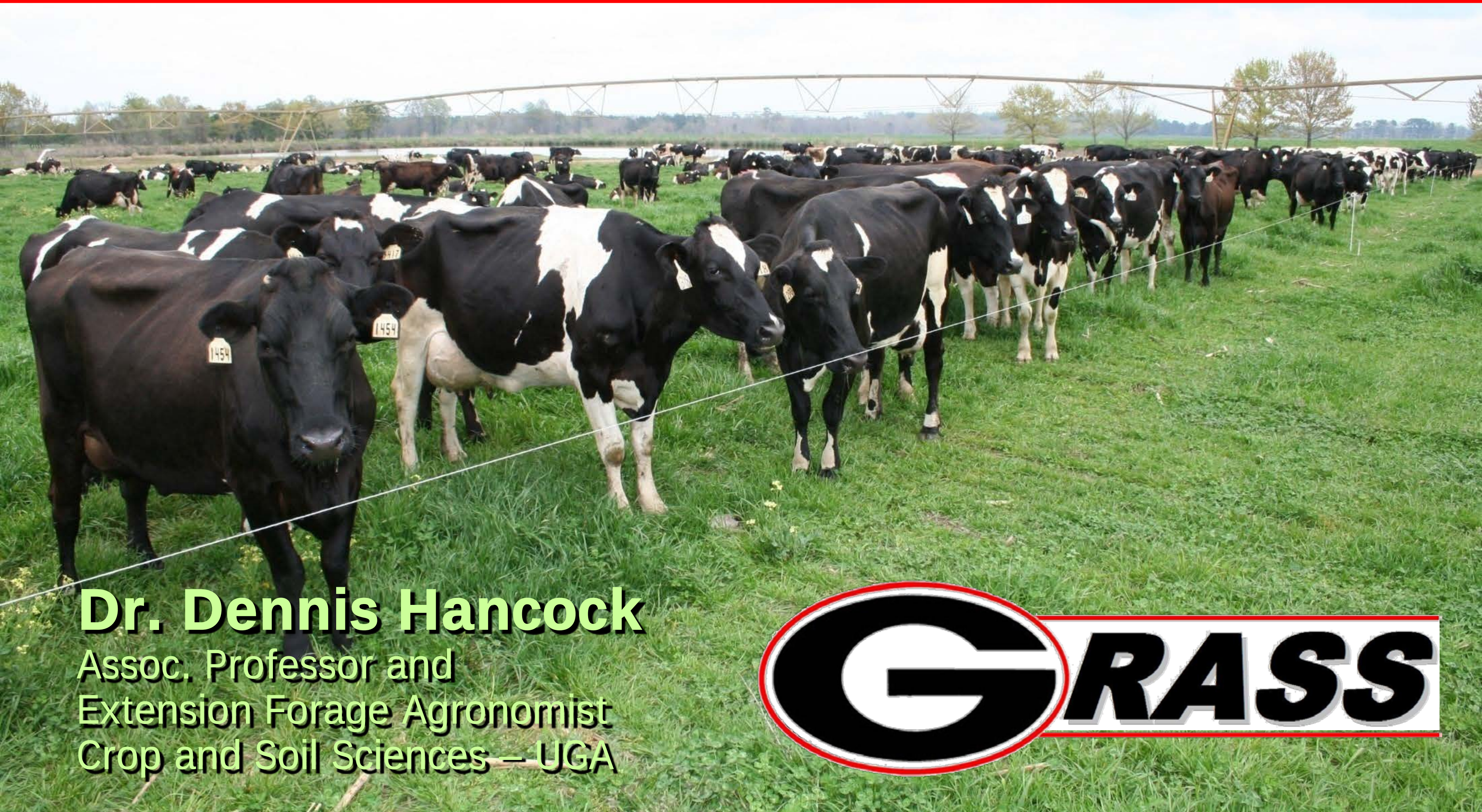
# Forage systems for warm season dairying



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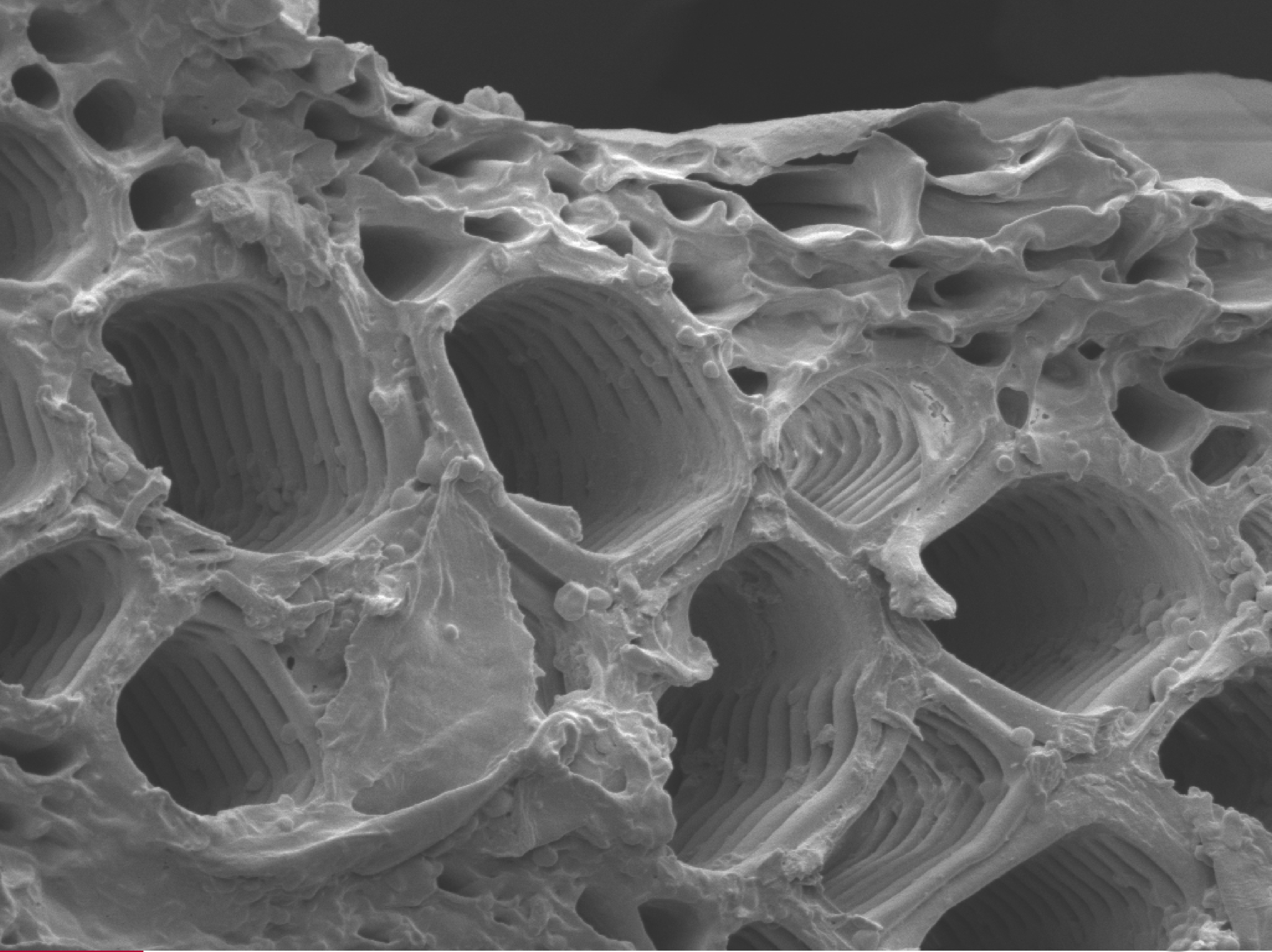
Crop and Soil Sciences – UGA

# Forage Yield of Selected Forage Species in the South

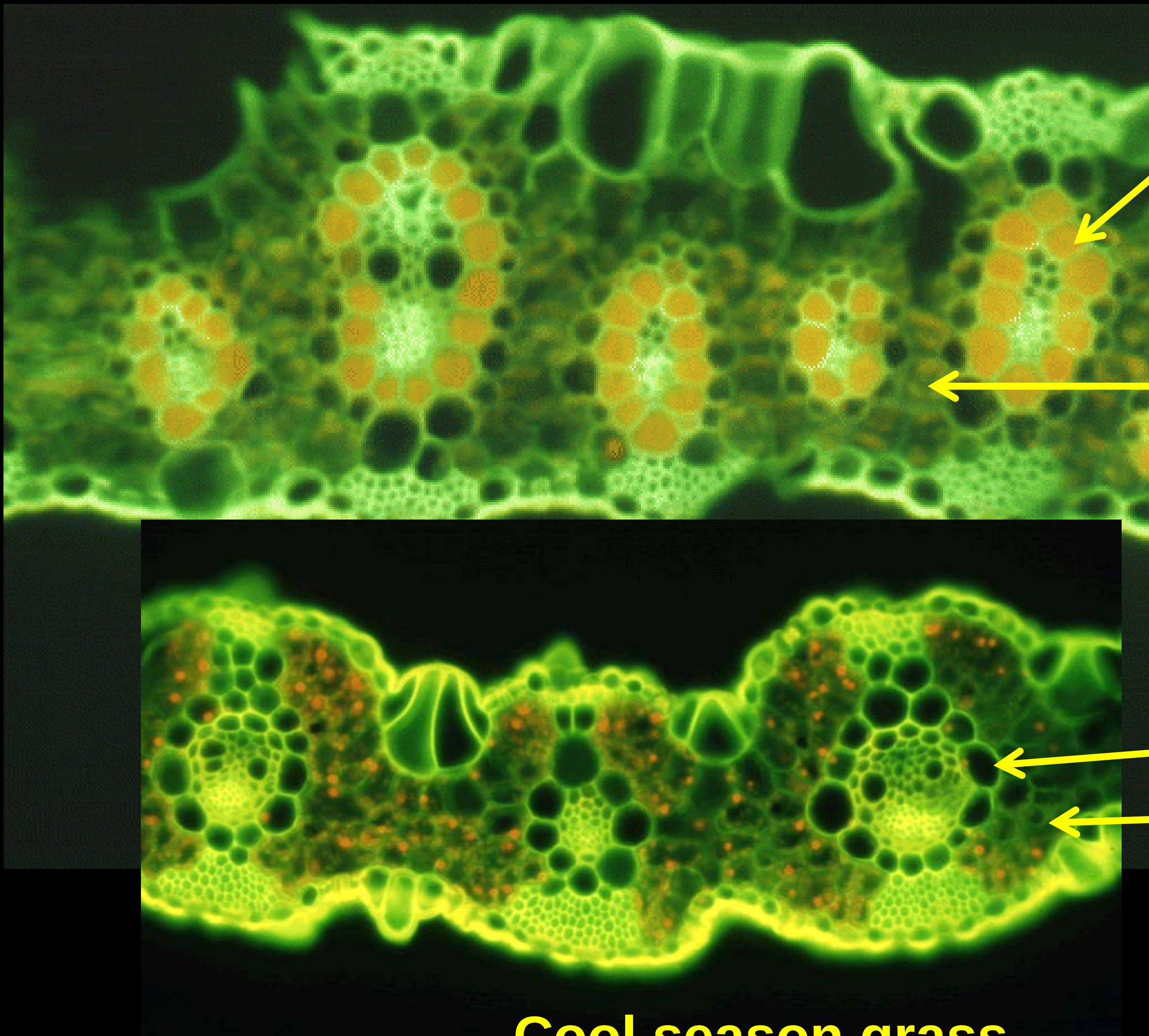
| Forage Crop | Typical Yield *(lbs DM/acre)* |
|---|---|
| Corn silage | 20,000-32,000 |
| Tropical corn silage | 5,000-22,000 |
| Ann. Ryegrass | 8,000-14,000 |
| Oats | 6,000-11,000 |
| Triticale | 3,000-7,000 |
| Bermudagrass, Coastal | 12,000-15,000 |
| Bermudagrass, Tifton 85 | 14,000-22,000 |
| 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

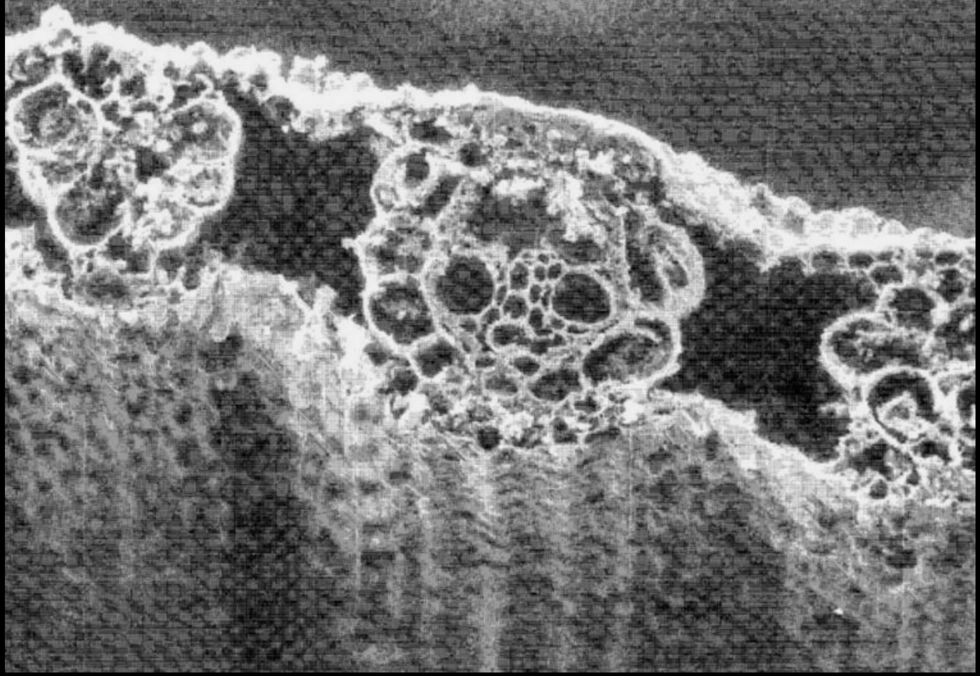
| Forage | CP | NDF | NDFD | NFC |
|---|---|---|---|---|
| | --------------------(%)-------------------- | | | |
| Corn silage | 8 | 42 | 58 | 42.5 |
| Forage Sorghum | 8 | 48 | 58 | 37.0 |
| BMR Forage Sorghum | 8 | 48 | 65 | 37.0 |
| Sorghum-Sudan (SxS) | 10 | 67 | 58 | 12.0 |
| BMR SxS | 10 | 67 | 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 |



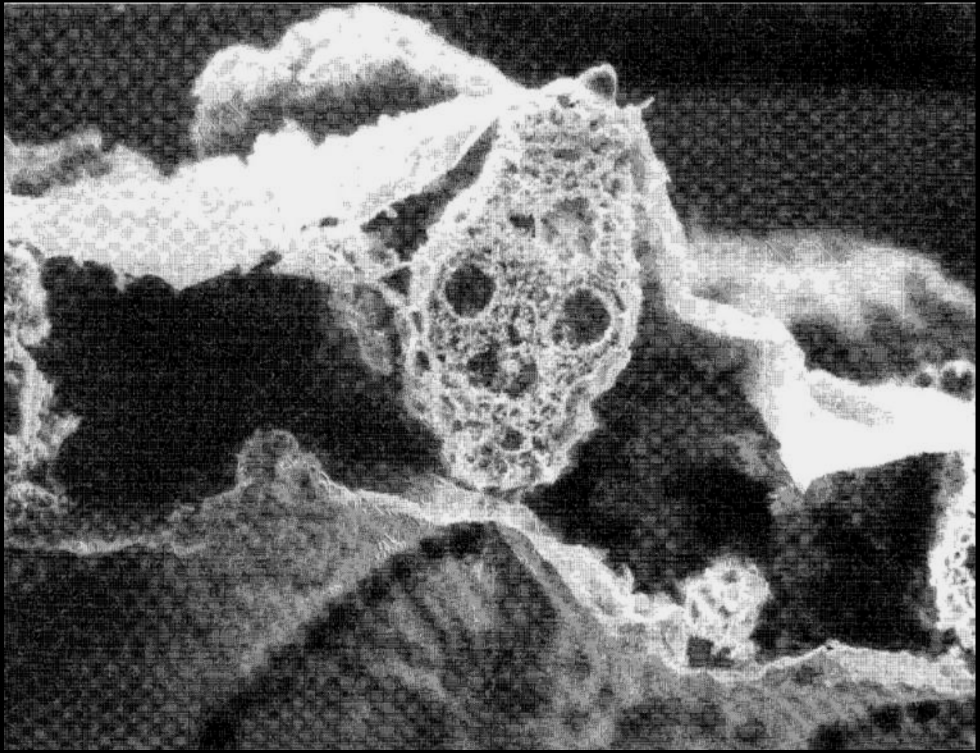
## Warm season grass




## Cool season grass

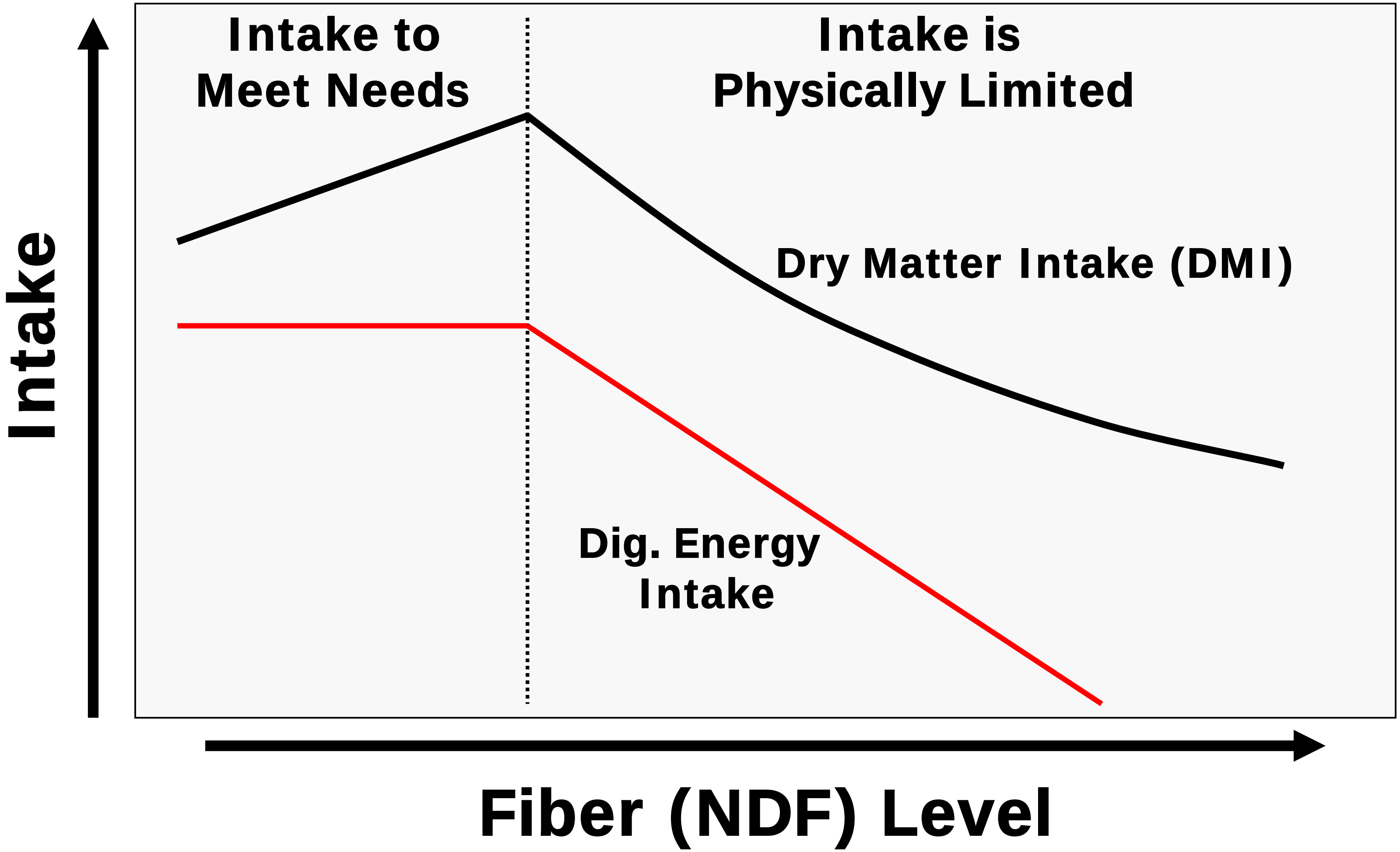


Bermudagrass leaf after incubation in rumen fluid for 48 hr

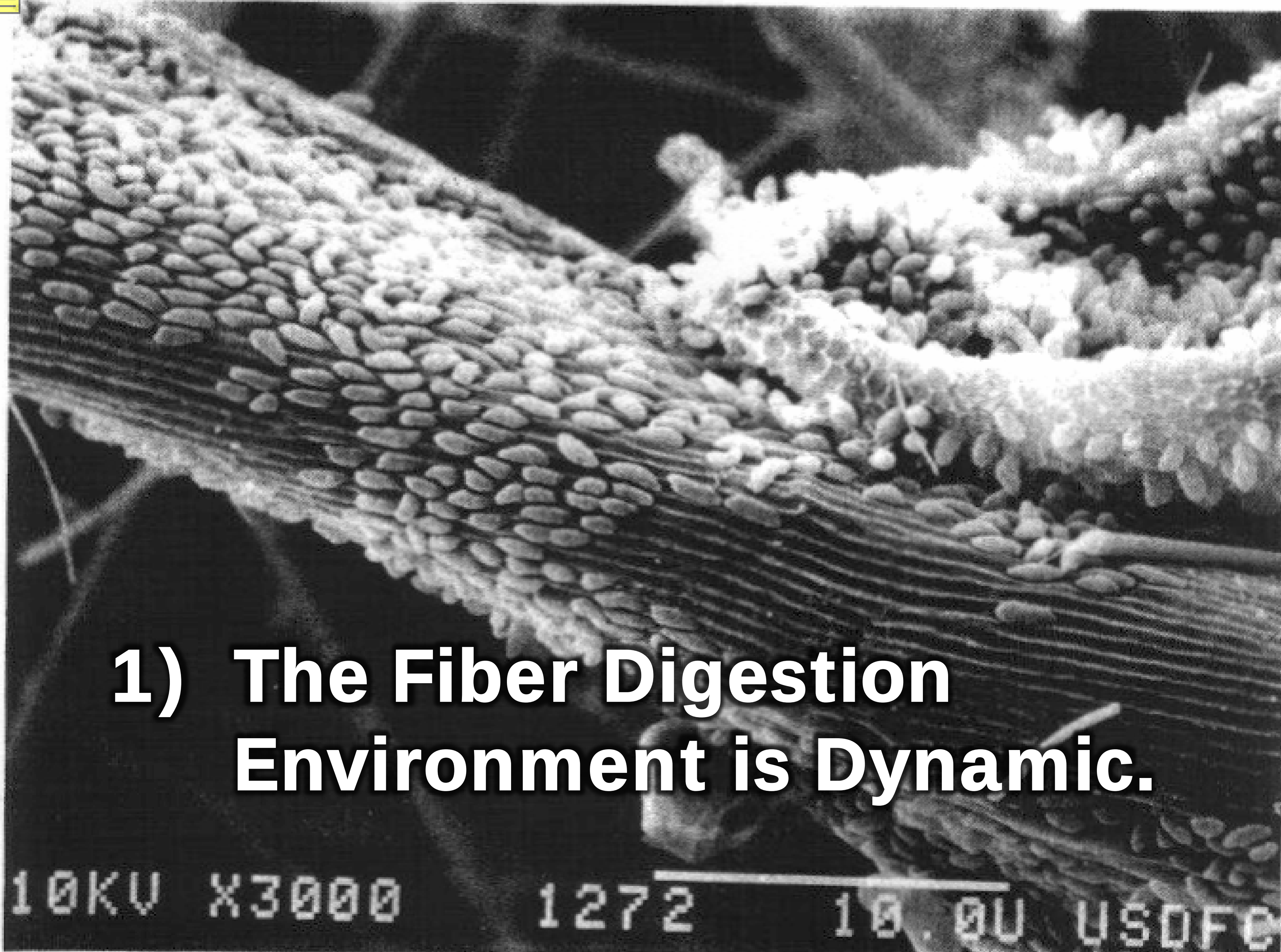


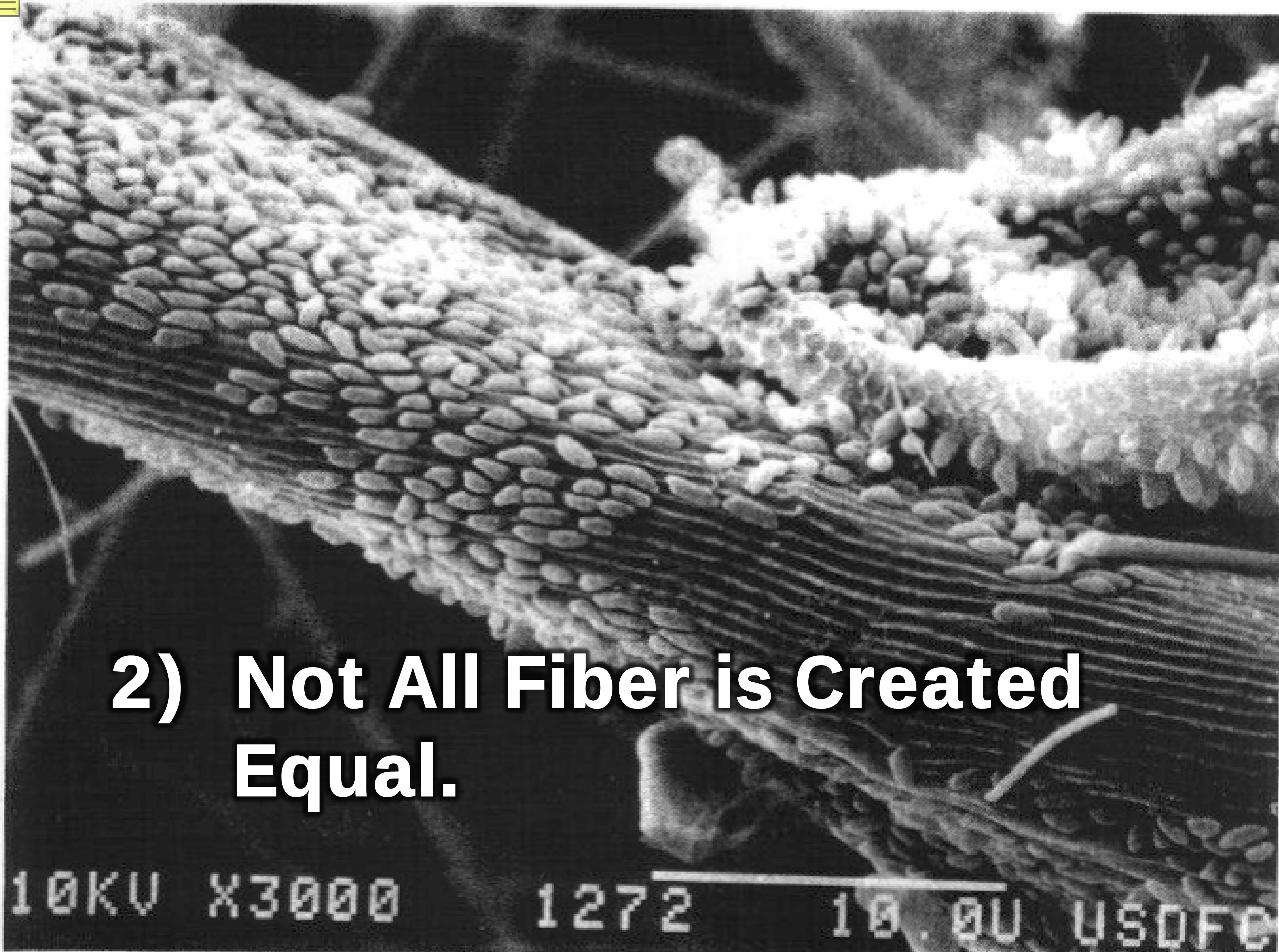
Tall fescue leaf after incubation in rumen fluid for 48 hr

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



# 1) The Fiber Digestion Environment is Dynamic.

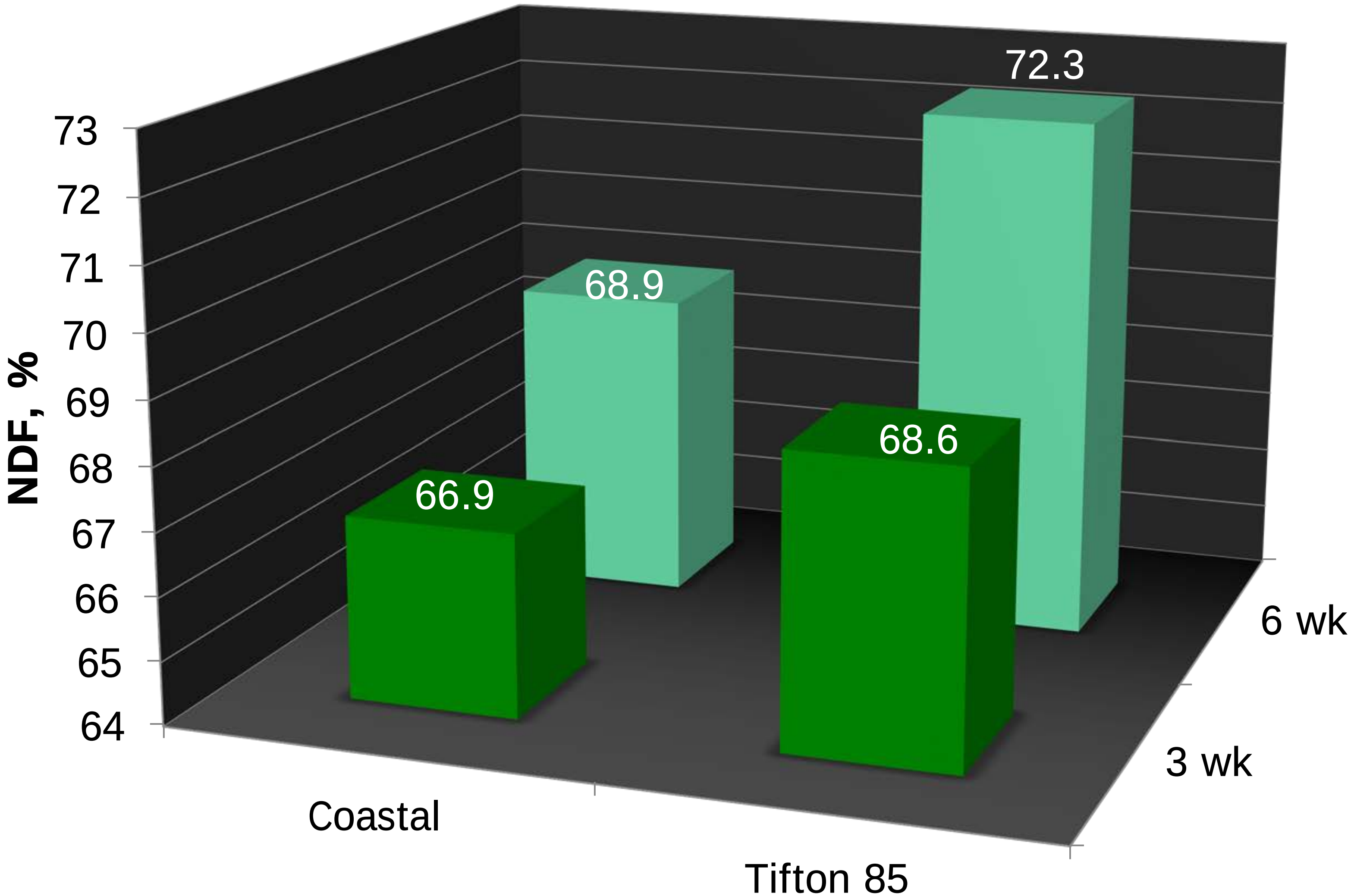





## 2) Not All Fiber is Created Equal.


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]

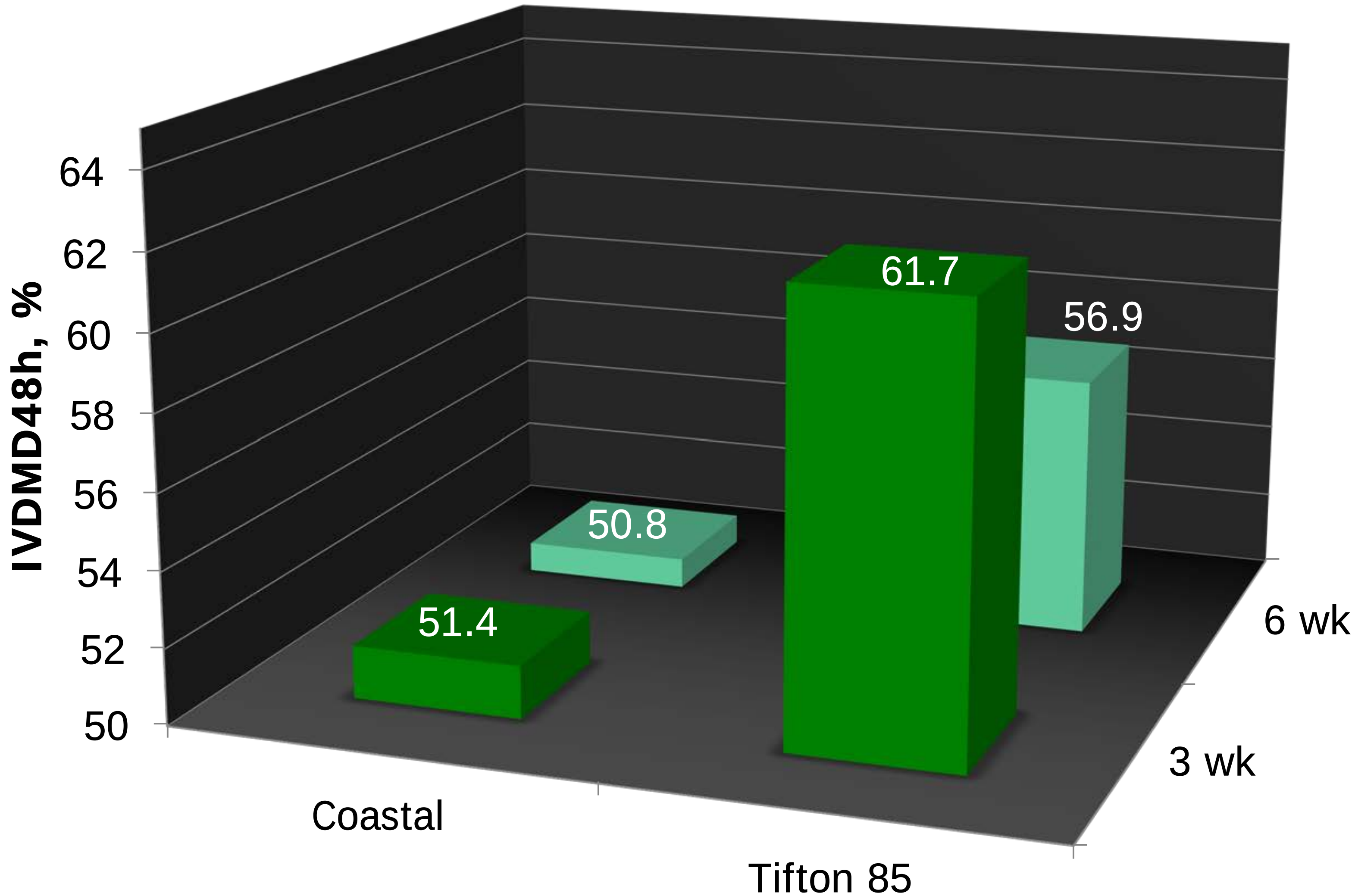
| Item | Control 45CS/0BH | | T85 Hay[2] 30CS/15BH | | 15CS/30BH | |
|---|---|---|---|---|---|---|
| DMI, lbs/cow/d | 50.4 | a | 48.6 | b | 48.4 | b |
| DMI, % of BW/d | 4.29 | a | 4.16 | b | 4.19 | b |
| Milk Yield, lbs/cow/d | 75.0 | a | 72.6 | ab | 70.0 | b |
| Fat, % | 3.33 | b | 3.73 | a | 3.72 | a |
| 3.5% FCM, lbs/cow/d | 73.9 | ab | 74.6 | a | 73.7 | b |
| *3.5% FCM:DMI[3]* | *1.47* | | *1.53* | | *1.52* | |

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.

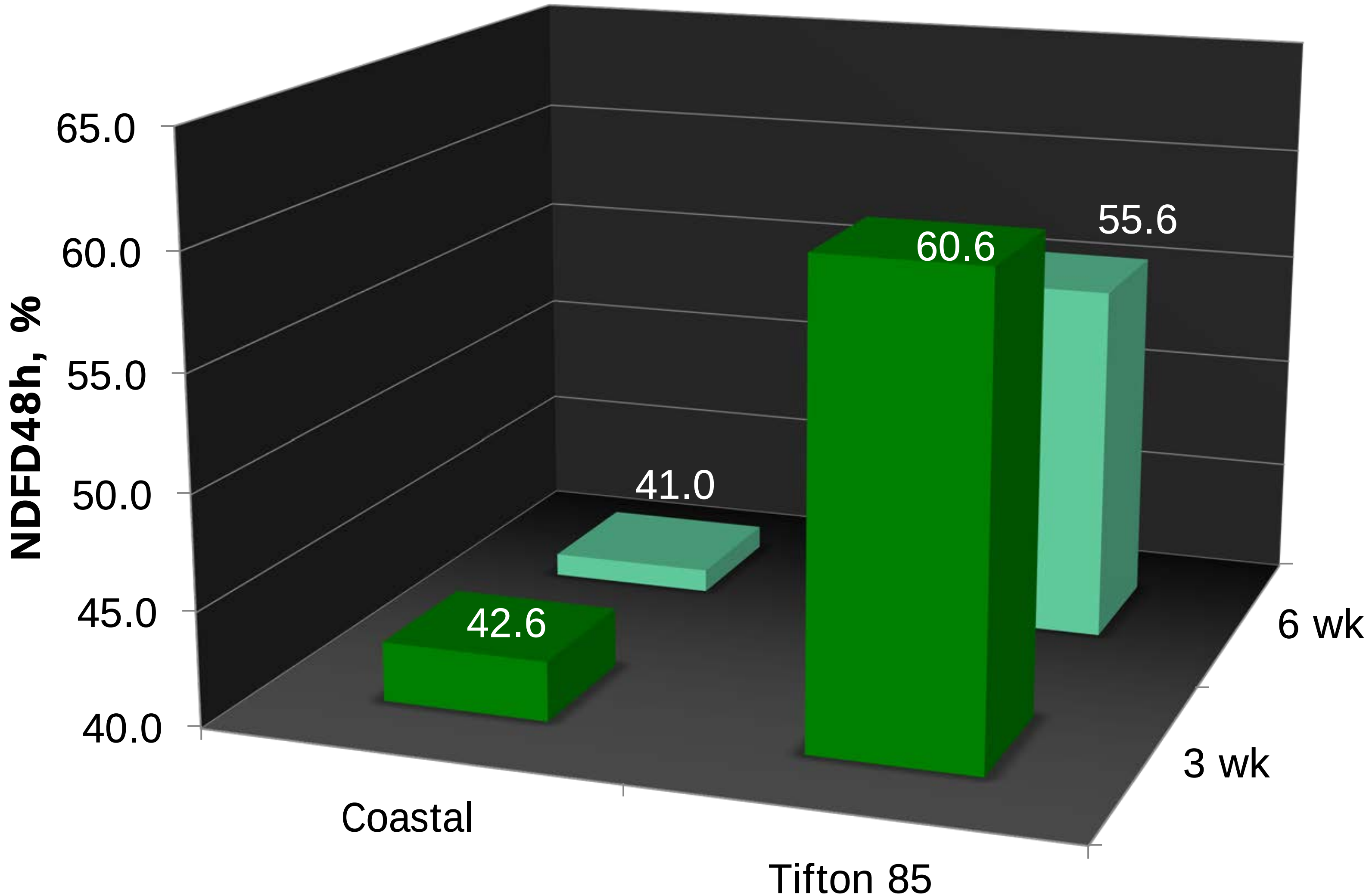
3 Calculated from reported values.

# What is the difference in Coastal and Tifton 85?



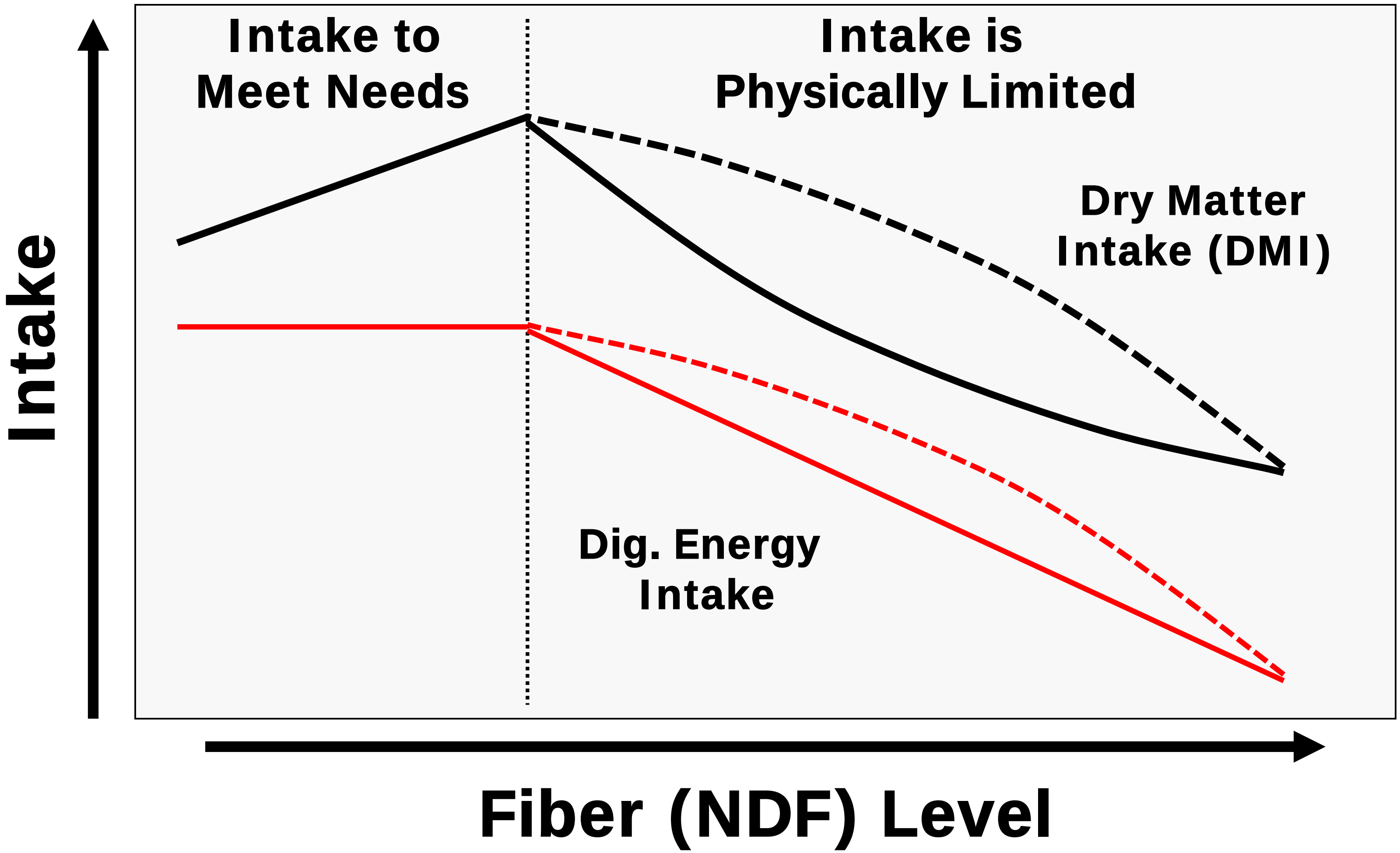

Adapted from Mandebvu et al. (1999).

# 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 NDF[1]

| | Proportion T85 in diet | | | | *P* |
|---|---|---|---|---|---|
| Item | 10 | 17.5 | 25 | SE | 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.

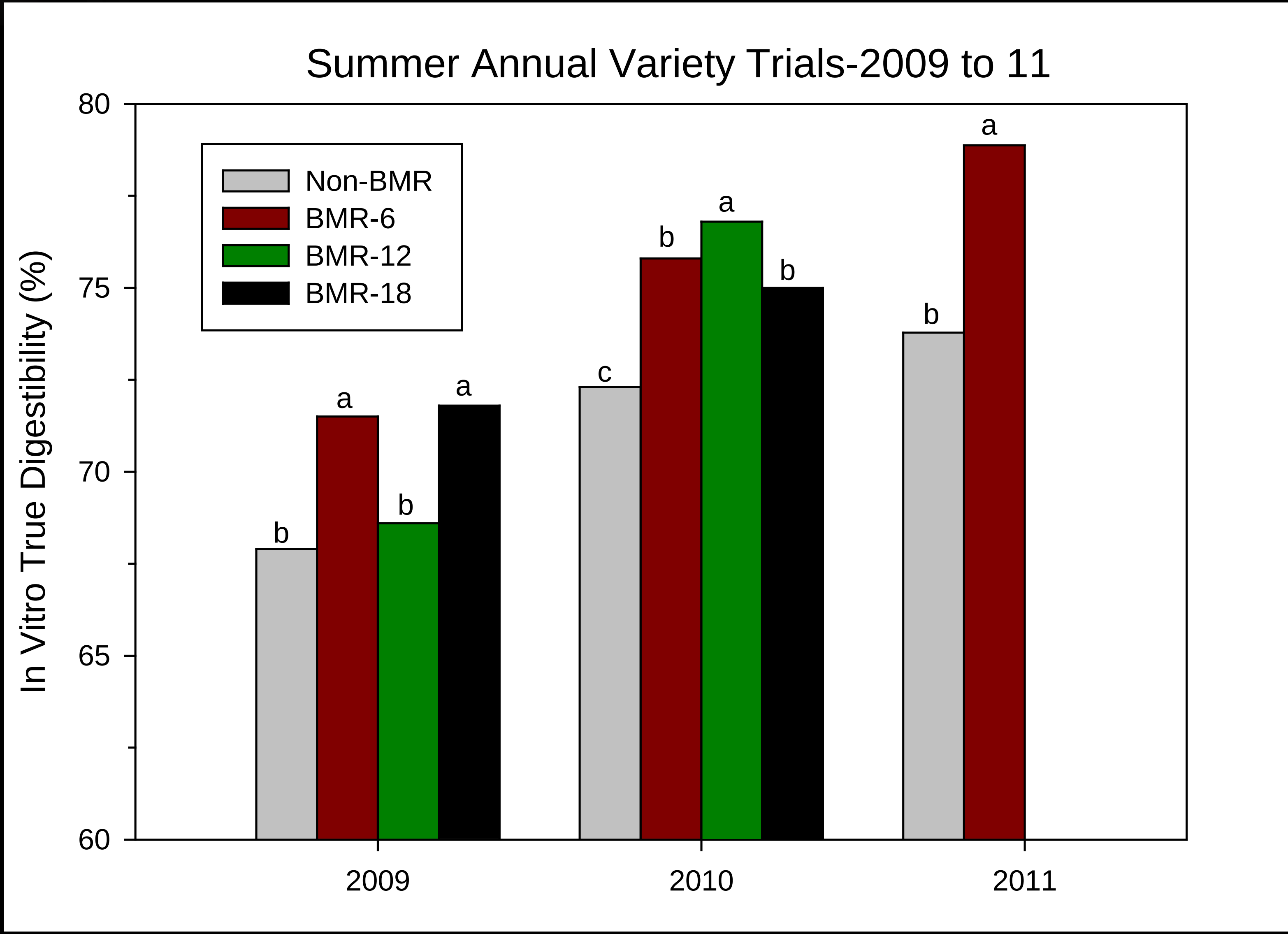
# Water Use in Forage Crops

| Crop | Water Used | | | Reference |
|---|---|---|---|---|
| | lb $H_2O$/ lb DM | Acre-inches $H_2O$/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




Teutsch et al., 2014

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

| Item | bmrSS[2] 35% | bmrSS[2] 45% | CS 35% | CS 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.

# 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 | Control<br>45CS/0AH | Alfalfa Hay[2]<br>30CS/15AH | <br>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 | 75.0 a | 75.0 a | 71.7 b |
| Fat, % | 3.33 c | 3.54 b | 3.99 a |
| 3.5% FCM, lbs/cow/d | 73.9 b | 75.5 a | 74.8 ab |
| *3.5% FCM:DMI[3]* | *1.47* | *1.52* | *1.51* |

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

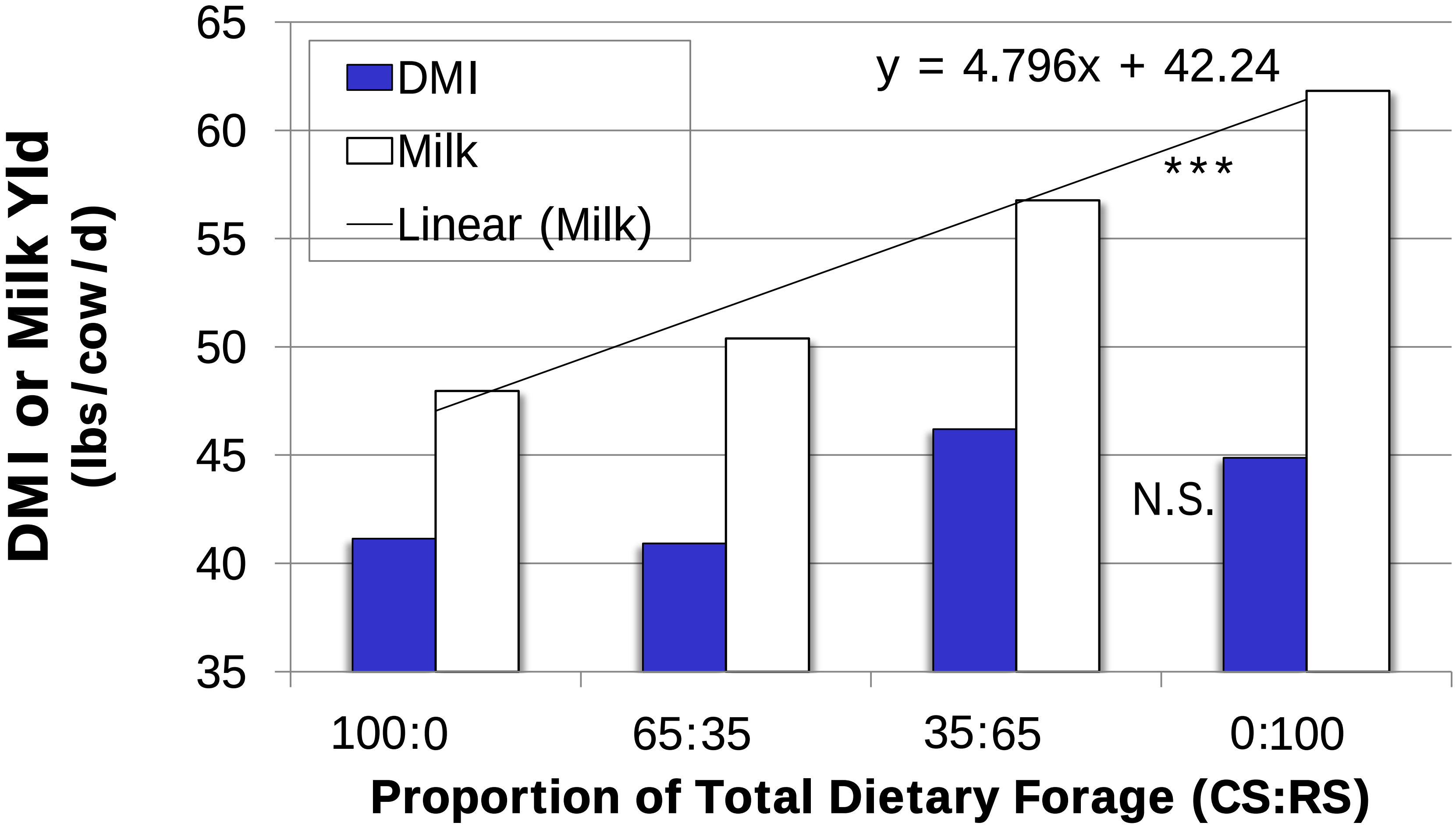
Alfalfa can be used effectively as an alt. to CS and we do have an opportunity to grow alfalfa with bermudagrass.

# Focus on Winter Annuals

GRASS
www.georgiaforages.com

# Potential to Reduce Costs with High Quality Grasses?

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




THE UNIVERSITY OF GEORGIA COOPERATIVE EXTENSION

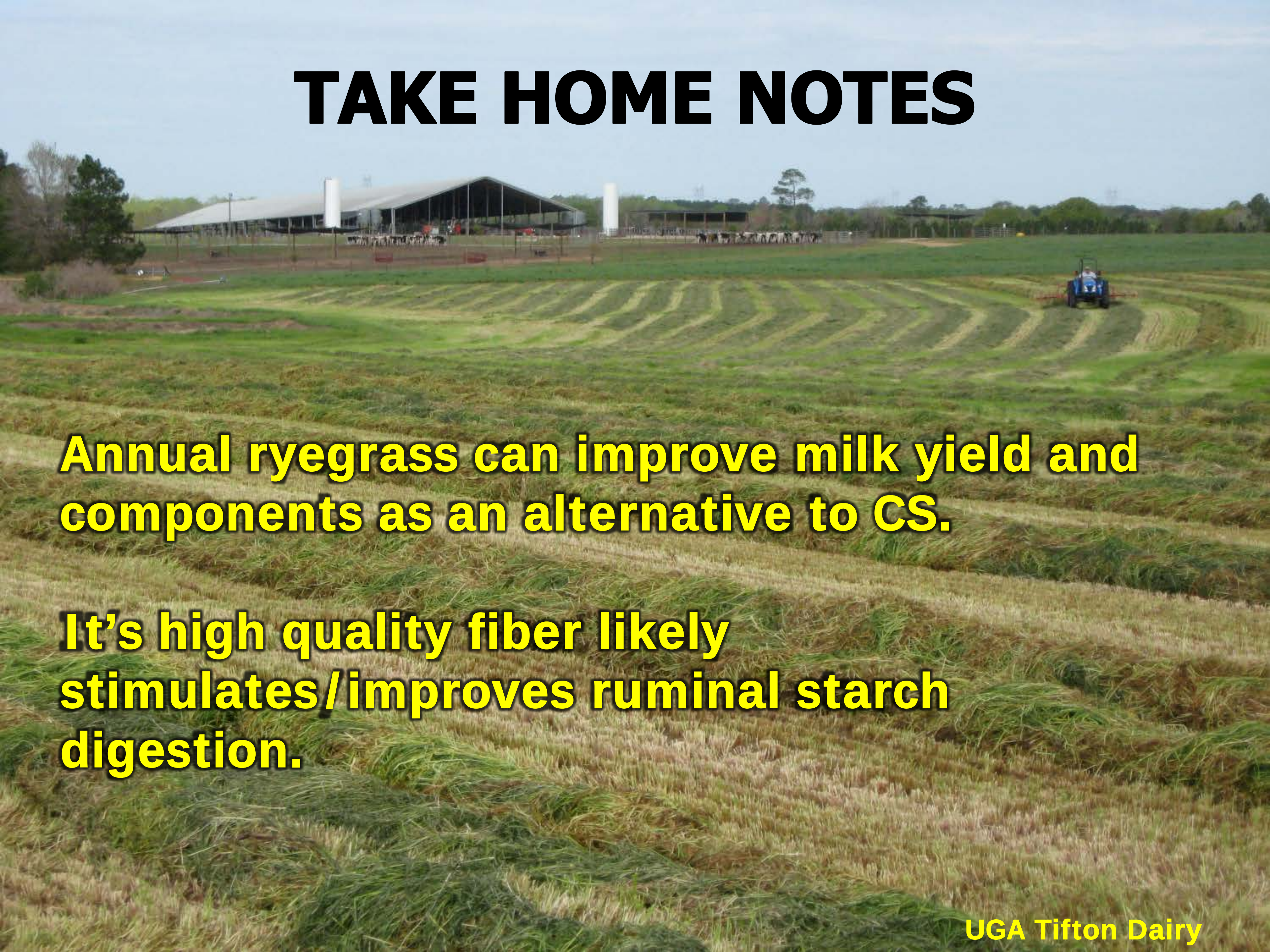
[1] Bernard et al., 2002. J. Dairy Sci. 85:2277–2282.

GRASS

# 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.



UGA Tifton Dairy

# 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?

GRASS

www.georgiaforages.com

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