Tips on Summer & Winter Annual Forage Quality—Maturity Effects, Feed Value & Preservation

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Objectives

- Guidance on understanding forage quality and to what degree it changes in annual winter and summer grasses
- Thoughts about how you—as a buyer or seller of forage—can ensure a better transaction
- Consider how you store your dry forage to preserve biomass and quality

Growing for Quality Forage

- For grazing and baling, energy level and nutritive value decreases with maturity, i.e., maximum TDN is at or just before boot stage for most annual grass forages
- Vegetative forage quality steadily decreases once the forage begins to head
  - How extensive is this change? Do you need to reconsider your forage approach?
- For silage, forage sorghum has highest TDN and optimum cutting at early-medium dough

Small Grains or Summer Annual Forages for Hay?

- Are you selling hay?
- Does your buyer understand small grains or haygrazer forage quality?
- Do you—and your buyer—understand how forage quality changes with time?
- Don’t <u>waste</u> high quality hay on animals that don’t need it (cows), or expect stockers to gain 2+ lbs./day on headed wheat

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Buying & Selling Hay?

- If buying hay, though you may eyeball the forage for stage of growth or weed content, <u>have you ever asked</u> if you can take a sample for forage analysis?
  - And what would you do if they said “No”? (would you/should you then prefer to take your prospective business elsewhere?—this is not a good situation if you are desperate)

- If selling hay, especially if high quality, have you taken a sample for info. for prospective buyers, or encouraged them to take a sample themselves? (you might need to agree on which lab for analysis).

The "Trap" of Beardless Wheat (1)

- Here is a concept I wish to introduce to readers, then we will return to this topic later:
- When I (Trostle) came to West Texas in 1999, I had never heard of 'beardless wheat' (I am a Kansas farm boy, Kansas is "The Wheat State," and a **Kansas State Univ.** agronomy graduate)—*"How could that be?"* I have sometimes wondered.
- West Texas farmers and cattleman talked as if beardless wheat was superior small grains forage

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The “Trap” of Beardless Wheat (2)

- My data for small grains forage clipping trials in the Texas High Plains indicates beardless wheats have no more forage production (as a group) than regular bearded wheats
- But you can graze or bale these beardless wheats longer than bearded wheat: little worry about the awns (‘beards’) causing a problem with animal health (getting stuck in their throat, poking eyes, etc.)
- Hence the ‘Trap’ of beardless wheat: *What is it?* *(stay tuned…)*

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1) What do you see?

2) Can you make any general assessment about forage quality?

3) Or assess possible future forage potential? (Aug. 14, near Levelland/Hockley Co., Texas)

What I See…

- It appears the sorghum/sudan averages about boot stage. I only see a few apparent heads visible, but more stalks that are not in boot yet.
- There is about 6” of stalk left at the bottom of the plant—this should drive regrowth.
- This is a high tonnage forage that will need to ensure proper drying time
- Based on August 14th cutting, there is at least 6 weeks of regrowth potential (possibly another cut; for sure significant grazing potential)

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What do you see? (Sept. 12th, near Brownfield, Terry Co., TX)

Should something different have been done in managing this field?

What I See…

- A “bamboo forest” of forage
- Is this still a valuable forage crop?
- Grazing began way too late, cattle stripped the leaves off, the forage headed out.
- Seeing how advanced the forage is, this sorghum/ sudan probably should have been cut for hay (not grazed).
- There is forage waste and waste of $.

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Examples of Changes in Basic Forage Parameters with Time (West Texas Examples)

- Forage yields change with time—a little or a lot?
- Forage quality parameters change with time—a little or a lot?

- What should a producer do?
- Is there a 'happy medium'?
- What is the value of increased forage tonnage vs. higher nutritive value?

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Remember (Slides 3 & 4)…

- View forage tonnage and forage quality through the lenses of:
  - Buying vs. selling vs. feeding the forage yourself
  - The type of animal that will be fed and its nutritional requirements
  - Forage supply, cost of feeding, the cost of supplementing (if needed)

Simple Examples of Small Grains Forage

- #1 Oats, Lubbock Co., Texas example (irrigated, planted Feb. 15 for spring forage production)
  - This is a proxy for wheat
  - Oats would not have the issue of beards in the head like wheat, triticale, barley, rye
  - Harvested six Fridays in a row…

- #2 Wheat, Castro Co., Texas example (data taken from a field that was otherwise for grain) (Rick Auckerman, now Deaf Smith Co. AgriLife Extension agent, Hereford)

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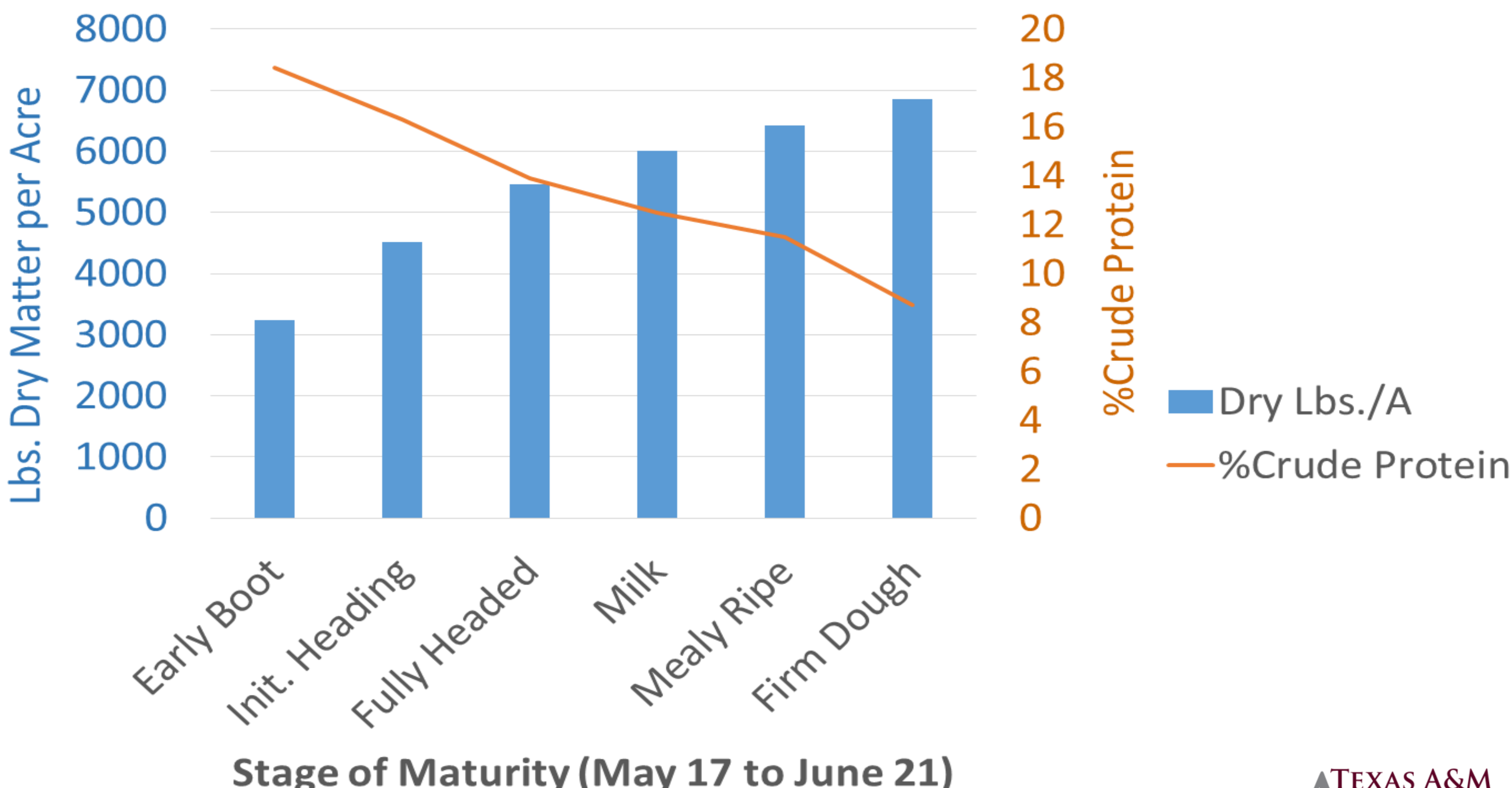
Lubbock Co. Oat Trial
One-time Hay Harvest, var. *Troy*

Growth Stage	Harvest Date	Dry Hay Lbs./A	% Crude Protein	Lbs. CP per acre
Early Boot	May 17	3,240	18.4	596
Init. Heading	May 24	4,510	16.3	735
Fully Headed	May 31	5,465	13.9	760
Milk	June 7	6,010	12.5	751
Mealy Ripe	June 14	6,420	11.5	738
Firm Dough	June 21	6,845	8.7	596

Troy oat was harvested for six Fridays in a row among extra plots. Yield was taken for three plots at each date, individually each sample analyzed for crude protein. When you consider your tonnage and forage quality goals, and your use or your market, which scenario is best for you?

Lubbock Co. Oat Trial One-Time Hay Harvest, var. *Troy* (cut every Friday)



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What would you choose?

- At boot stage you may consider that the forage yield was not enough to justify harvest when you see the further increase in forage yield (Example 1: Over a ton increased yield in another 14 days;)

- %Crude protein is still a respectable 13.9%.

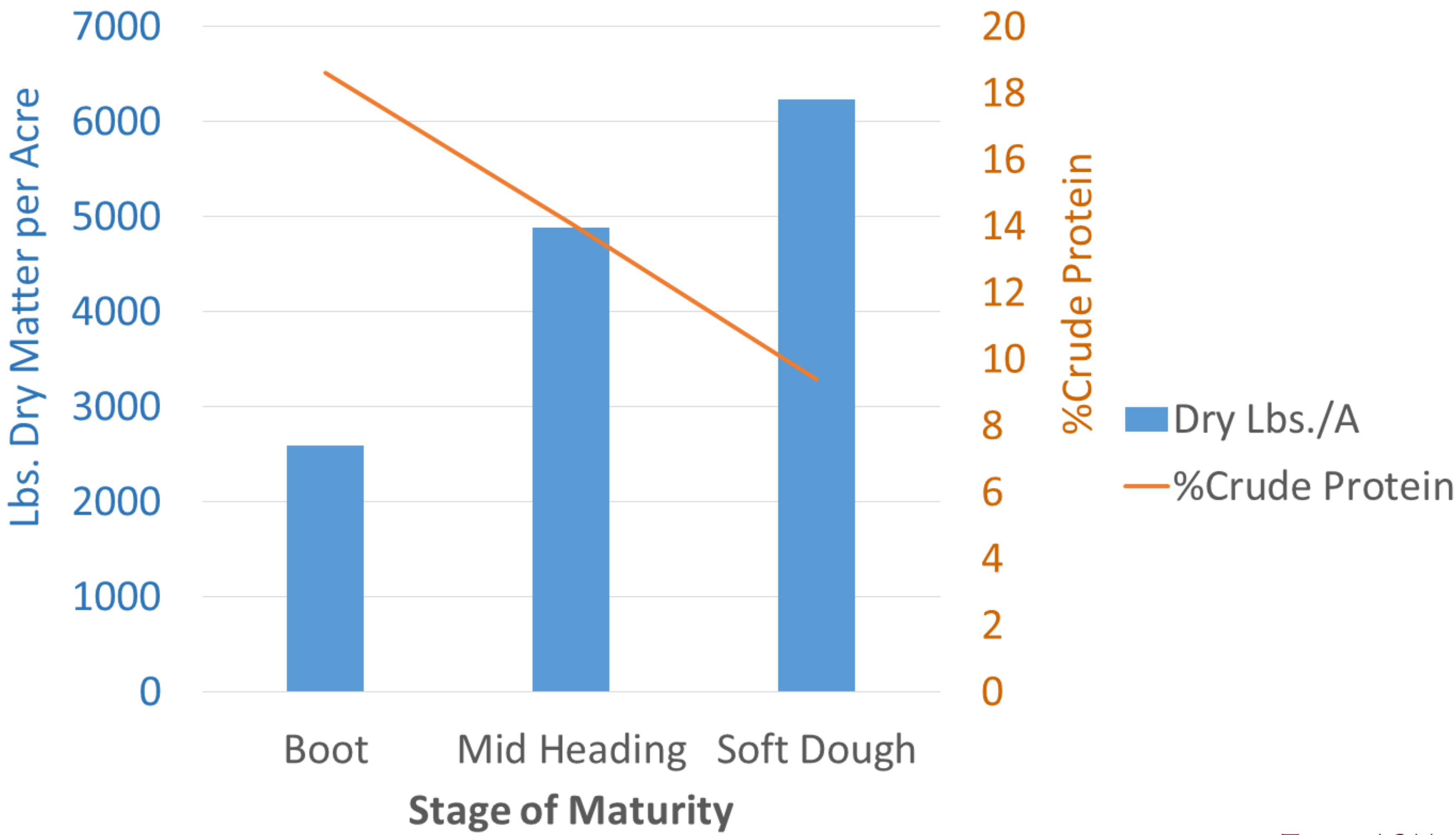
- But you may consider this differently if wheat (both for bearded wheat and beardless wheat).

Wheat Hay—Castro Co., Texas

Growth Stage	Dry lbs./A	%CP
Boot	2,590	18.6
Mid-heading	4,890	14.1
Soft Dough	6,230	9.4

Rick Auckerman, Texas A&M AgriLife Extension (currently Deaf Smith Co.)

Wheat Hay—Castro Co.



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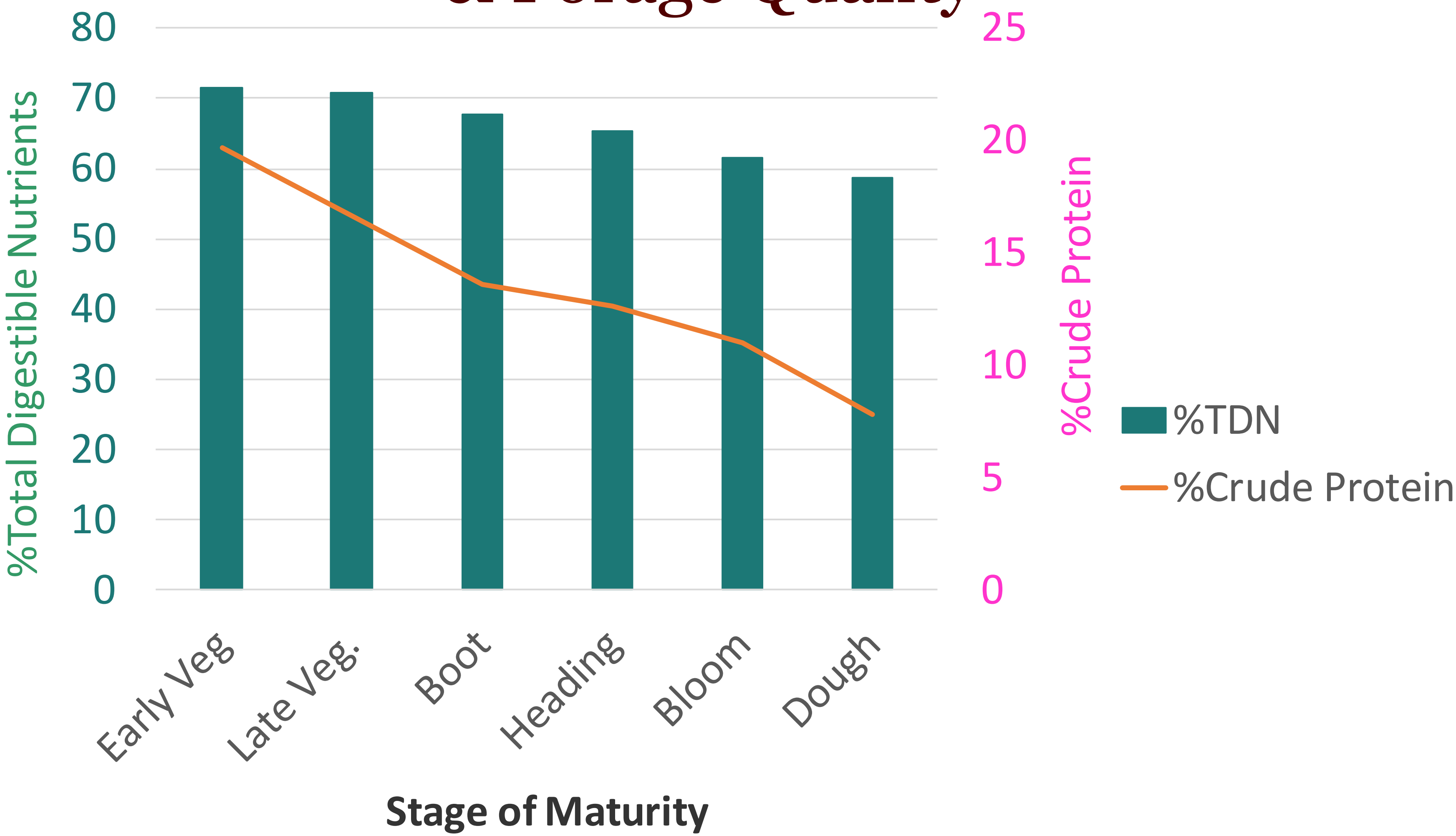
Now let's change crops to sorghum/sudan

Sorghum/Sudan Hay Forage

Stage of Maturity vs. Forage Quality

Stage of Maturity	% TDN	% Crude Protein
Early Veg.	71.5	19.7
Late Veg.	70.9	16.6
Boot	67.7	13.6
Heading	65.3	12.6
Bloom	61.5	11.0
Dough	58.8	7.8

Sorghum/Sudangrass Growth Stage & Forage Quality



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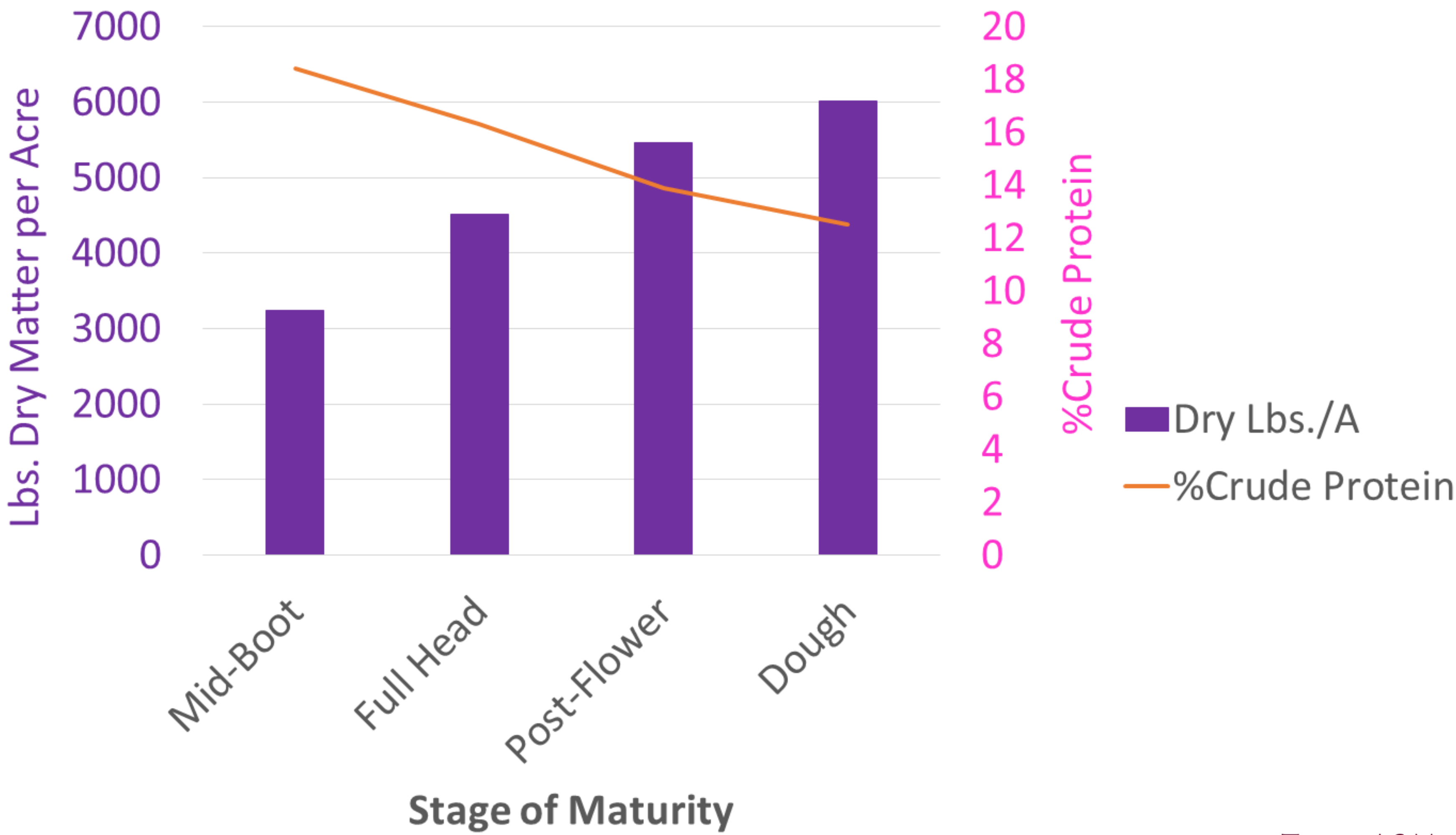
Sorghum/Sudan for Forage Hay

Swisher Co., 2-week intervals

Stage of Maturity	Wet tons per Acre	% Crude Protein
Begin:	August 13th	
Mid-boot	10.0	15.1
Full head	12.9	13.0
Post-flower	15.7	10.6
Dough	18.2	8.8

Sorghum/Sudan for Forage Hay

Swisher Co. (2-week intervals beginning Aug. 13)



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Growing for Quality Forage

- Feeding vs. selling
- Type of animal--cows vs. stockers
- Low quality forage often costs more to feed
- Does a potential buyer appreciate quality and is willing to pay for it?

- Key: Harvest at proper stage to meet your goals

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The “Trap” of Beardless Wheat (1)

Now in review… Applying the Discussed Concepts

- Here is a concept I wish to introduce to readers, then we will return to this topic later:
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The "Trap" of Beardless Wheat (2)

Now in review…

- My data for small grains forage clipping trials in the Texas High Plains indicates beardless wheats had no more forage production (as a group) than regular bearded wheats
- But you can graze or bale these beardless wheats longer than bearded wheat: little worry about the awns ('beards') causing a problem with animal health (getting stuck in their throat, poking eyes, etc.)
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The "Trap" of Beardless Wheat (3)

- Beardless wheat—if being beardless matters and is what you are shooting for because you can let it grow longer—it means <u>lower quality forage</u>
- By extending the grazing or haying season you have perhaps *unwittingly accepted* lower quality forage
- Is this what you wanted? Were you aware of the issue?
  - Yes, you get more tons of hay, but this might be counterproductive.

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“Further Forage Flaw” Forage analysis vs. animal utilization

- For wheat or other small grains and for summer sorghum/sudans, if grain develops it is increasingly less digestible—the animal does not get all the feed value.
- But most forage tests will grind/pulverize the sample then run a wet chemistry analysis (or perhaps dry analysis like NIR)
- Those tests could inflate the actual forage value compared to what the animal realizes as seeds dry down, even in dough stage, and these hard seeds can pass through with incomplete digestion—the chemical forage analysis is more than what is realized by the animal (IVTD measures attempt to adjust for this).

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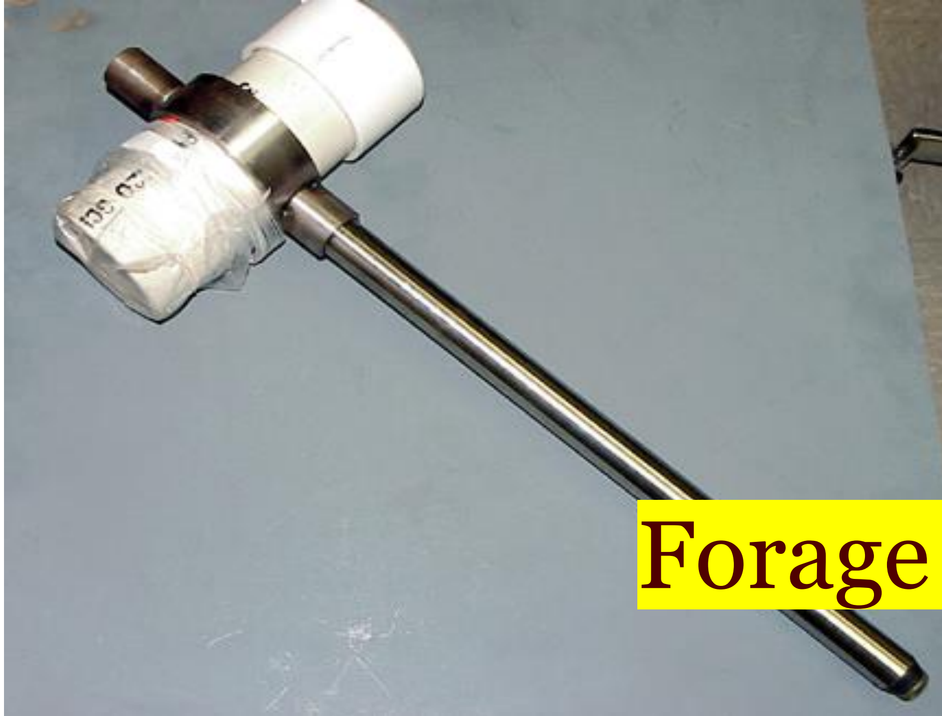
Forage Sampling



Poison Problems

- Prussic acid—primarily forages in the sorghum family
  - Droughty conditions in the summer
  - Frost/freeze in the Fall
  - Dissipates in properly cured hay
  - 200 ppm is toxic (decision may be based on "presence"
  - Call ahead for instructions to properly collect, transport sample as prussic acid changes in the sample
    - I suggest TVMDL lab, see below
  - To learn more: Texas A&M AgriLife's "Nitrate and Prussic Acid in Forages (E-543)", download from http://www.agrilifebookstore.org
  - Also Texas Veterinary Medical Diagnostic Lab, Amarillo & College Station, http://tvmdl.tamu.edu; "Toxic Forages (http://www.agrilifebookstore.org)

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Poison Problems

- Nitrate
  - Concentration is higher in lower stalk
  - Often occurs in droughty conditions--though plants are not growing, nitrate continues to accumulate; also watch out for high N fertilizer rates
  - Maximum of 1.0% nitrate for healthy animals, higher in lower stalk; high in weeds
  - Does not dissipate in hay once cut (locked in)
- To learn more: Texas A&M AgriLife's "Nitrate and Prussic Acid in Forages (E-543)", download from http://www.agrilifebookstore.org

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Reduce Storage Losses

You put a lot of effort into producing or purchasing quality hay….

…but then you give it up due to improper storage. This is not a fun way to lose money!

Impressions: What do you see in this Dallam Co., TX, picture?

High value alfalfa hay…

1) you are looking at the back side of rain clouds,
2) there is no cover on the stack
3) bales stored on the dirt.

This hay stack is losing value by the day.

Dumb Things We Do

- Forage Losses in Round Bales During 1 Year
  - 5%
  - 10%
  - 15%
  - 20%
  - 25%

  - How high do you think losses could be?

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Hay Losses in Round Bales

- Assumes moisture in bale is low:

- After 1 year (Northeast Kansas, ~32” of annual rainfall
- Texas High Plains about 16-18”):
  - Stored inside, 8% loss
  - Stored outside on rock bed, 15% loss
  - Stored outside on dirt, 24% loss

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Dumb Things We Do (#2)

- Feeding loose hay (or other supplements) on the ground
- Not using big round bale racks
- Baling when leaves are falling off (especially for legumes)
- Failure to maintain our feed bunks (fiberglass may be your best bet)

Savvy Buyers Want Good Quality Hay

- Look for weeds
- Ask for a forage analysis, or take your own
- Is it headed out? (or other stage of growth observations)
- Is it BMR (sorghum/sudan)? Is it reduced-lignin alfalfa (certain varieties have this trait)?
- Cut in morning or afternoon?
- Price vs. storage method (including wrapped big round bales)?
- Leaves missing?

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Savvy Consumers Want Good Quality Hay

A few quick notes on different hybrids within the sorghums (another forage quality consideration)

- Within forage sorghums (large one-time harvest, usually for silage) or sorghum/sudans (multiple forage cuts or extended grazing—in both cases regrowth occurs).

- Specifically the brown midrib or BMR trait.

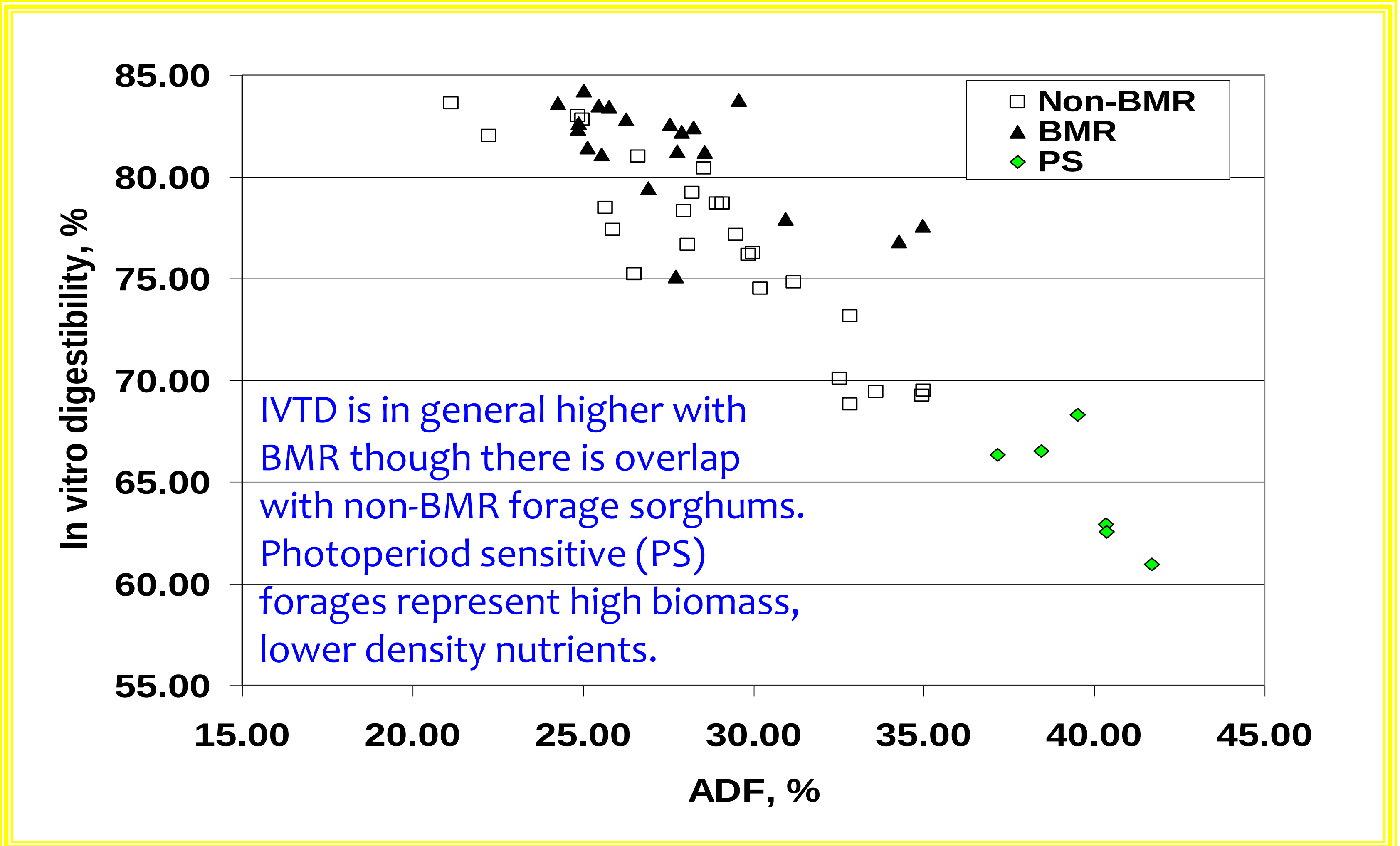
Bushland, Texas

Non-brown midrib and brown midrib sorghums and sorghum X sudan hybrids (each harvested as a group) for silage (2001)

Character	Non-BMR	BMR	P
Crude protein, %	8.3	9.2	0.0001
NDF, %	49.1	45.9	0.01
ADF, %	29.9	27.6	0.02
Lignin, %	4.4	3.6	0.0001
In vitro true digestibility, %	75.5	81.3	0.0001

IVTD up 5.6% in BMR, 18.2% reduction in lignin in BMR.
These results are typical of other AgriLife trials.
(McCollum et al. 2002)

ADF and In vitro digestibility distributions for non-brown midrib, brown midrib, and photoperiod sensitive sorghum hybrids harvested for silage (2001)

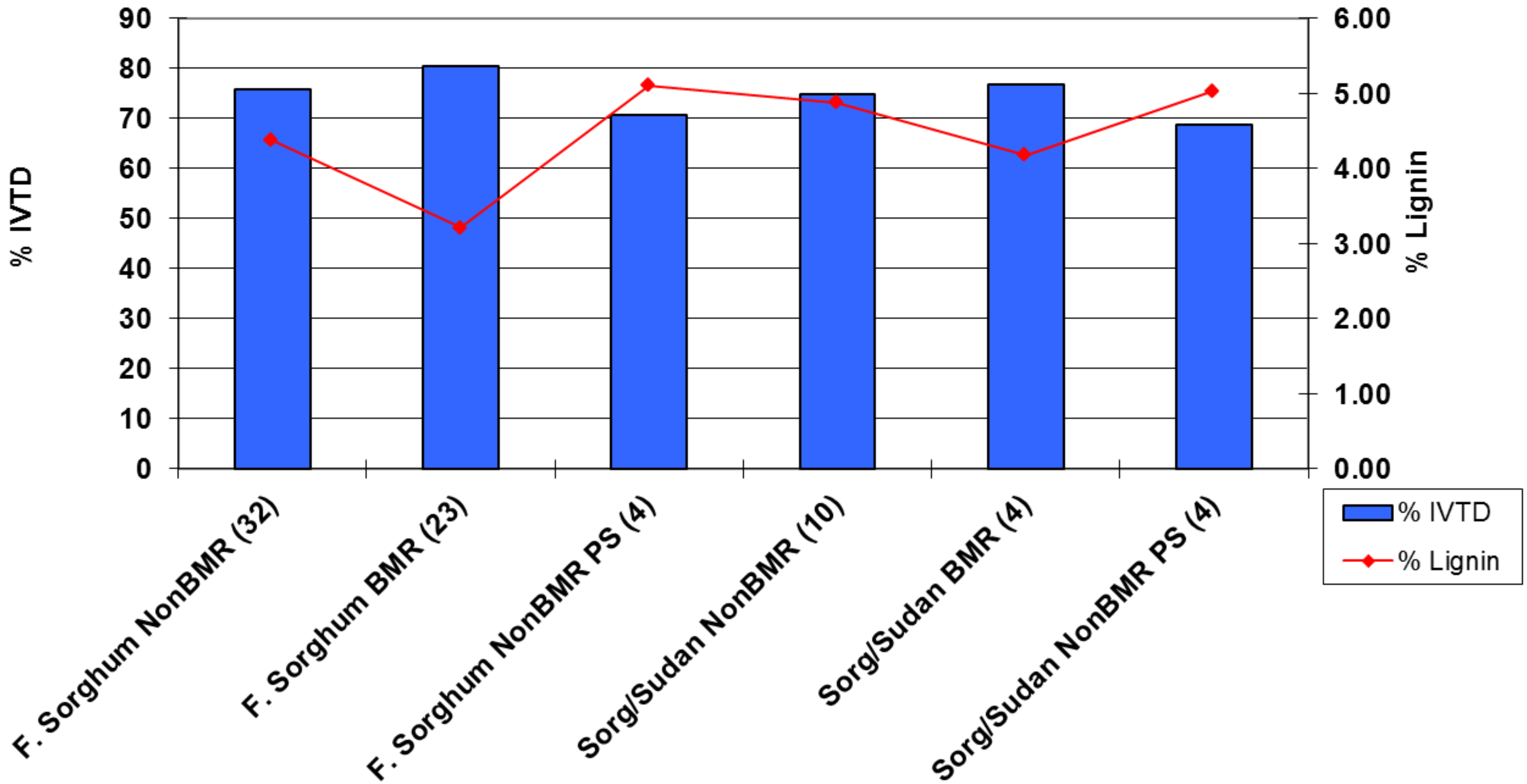


Same S/S Nutrient Analyses – Bushland, 2001; now compared to corn (BMR approaches corn)

Type	CP, %	ADF, %	NDF, %	Lignin, %	IVTD, %
Corn	9.0	23.9	41.2	3.5	82.7
Range	8.4 to 9.7	18.2 to 27.4	33.7 to 45.8	2.7 to 4.2	78.3 to 88.1

BMR	9.2	27.6	45.9	3.6	81.3
Range	6.9 to 10.5	24.3 to 35.0	40.7 to 60.1	2.8 to 4.5	75.1 to 84.2
Non-BMR	8.3	29.9	49.1	4.4	75.5
Range	6.3 to 10.8	21.3 to 41.7	33.9 to 67.5	2.7 to 6.4	60.9 to 83.6

Comparison of Sorghum Types for % IVTD and % Lignin -- 2003



Number in parentheses is number of hybrids for each sorghum type.
By comparison three corn hybrids averaged 84% IVTD and 2.8% lignin.