Growing Grasses for Dairy Rations

Dairy-Forage Toolbox Seminar
2010 World Dairy Expo

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USDA-Agriculture Research Service

Not this.....

or this.....

or this.....

But this.

Today's topics:

1) Why grow them?
2) Role of grasses in dairy rations
3) Selecting a species and variety
4) Harvest, Fertilization, and Storage
5) Forage quality considerations

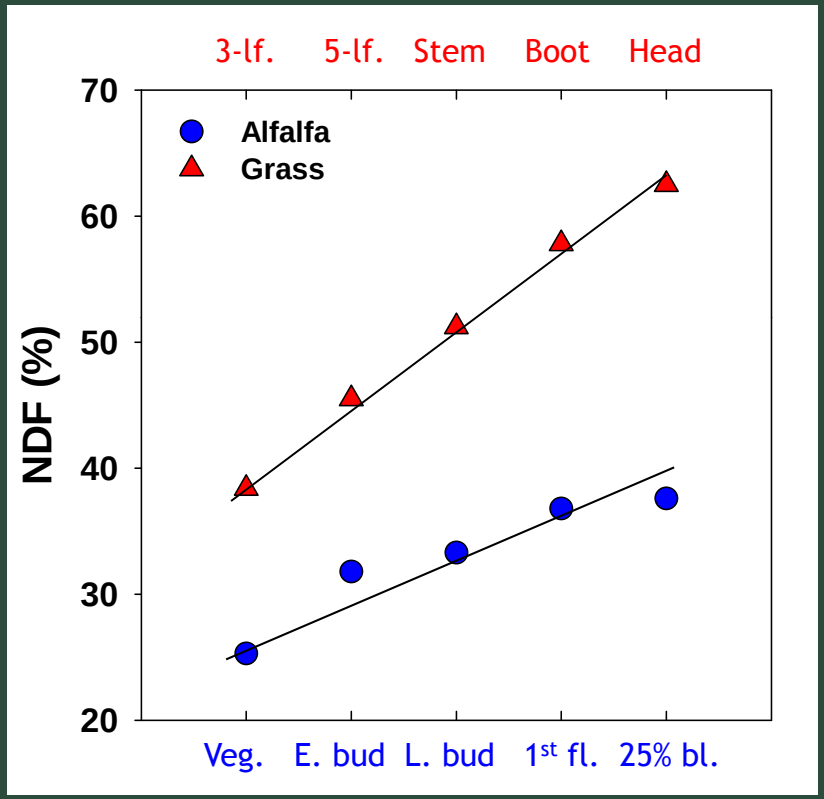
1) Why grow grass?

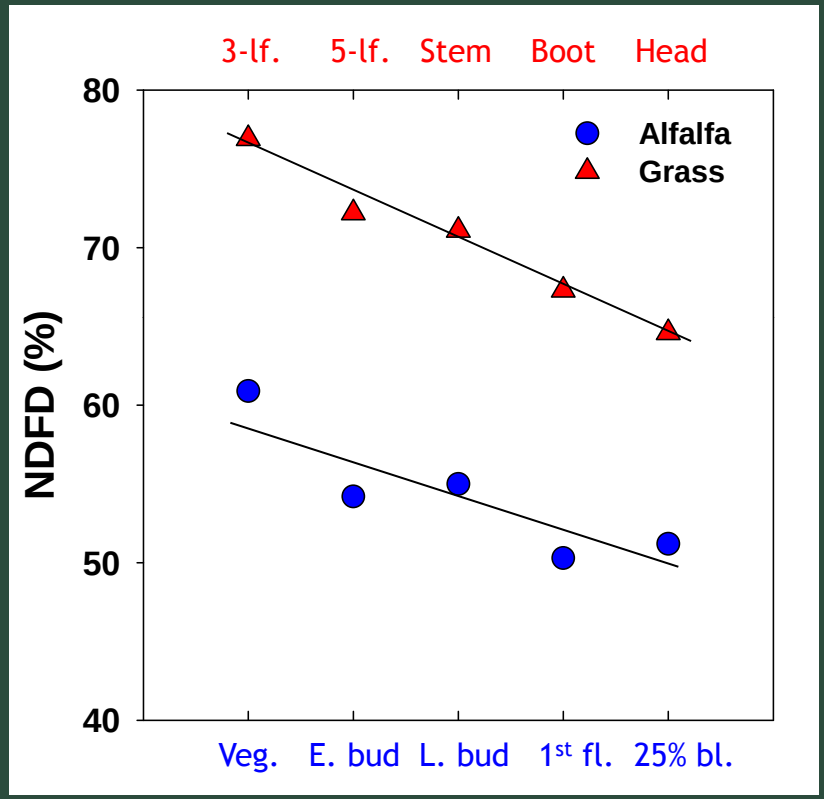
- Ration advantages:
  - Source of effective, but digestible, fiber.
  - Potential health benefits for dry cows and heifers.
- Agronomic advantages:
  - Adapted to a wide range of soils.
  - Fewer pest problems than alfalfa.
  - Dry faster than alfalfa.
  - Highly responsive to N.
  - Nutrient management; home-grown feed and opportunity to apply manure.

2) Role of grasses in dairy rations:

- Source of effective, but digestible, fiber.
  - Effective - promote rumen function.
  - Digestible – provide energy lacking in other high-fiber feeds.

Alfalfa vs. Grass





Brink and Casler, 2005
Brink et al., 2010

Producer response to the experts urging him to feed grass to his high-producing dairy cows:

"My herd averages 27,000 lb of milk on corn silage and alfalfa. Tell me again why I should put grass in their ration?"

What do the cows say?

Situation A: NDF of alfalfa and grass are similar.

	Alfalfa	Perennial Ryegrass
Forage NDF (%)	**44**	**47**
Forage NDFD (%)	**52**	**64**
NDF of diet (%)	**36**	**37**
Proportion of diet (%)	**70**	**68**
Intake (lb/day)	**50**	**45**
Milk (lb/day)	**70**	**66**
4% FCM (lb/day)	**65**	**64**

Hoffman et al., 1998.

Conclusion: DM intake and milk production of cows fed ryegrass are not limited by its nutritive value, but by limitations in particle degradation.

Situation B: NDF of alfalfa and grass are not similar.

	Alfalfa	Orchardgrass
Forage NDF (%)	**42**	**48**
Forage NDFD (%)	**30**	**61**
NDF of diet (%)	**27**	**28**
Proportion of diet (%)	**53**	**48**
HM corn (%)	**36**	**40**
Intake (lb/day)	**46**	**44**
Milk (lb/day)	**61**	**61**
3.5% FCM (lb/day)	**66**	**71**

Linton and Allen, 2007.

Interactive effect of diet: determined association between pre-treatment voluntary DM intake of the cows and their response to forage treatment.

Results and conclusions:

1. For cows with high pre-treatment voluntary DM intake, intake of alfalfa-based diets was greater than orchardgrass-based diets.
    - As appetite increased, intake was more restricted for more physically-filling orchardgrass than for alfalfa.

2. Grass-based diets have little negative effect on cows that have lower nutrient demand.

2) Role of grasses in dairy rations:

- ✓ Grasses provide a source of digestible fiber.
  - Will increase fiber content and slow passage, and if all other components remain the same, will reduce intake.
  - Have a positive effect on milk fat.

- ✓ As primary forage, have potential use in diets of early and late lactation cows, but not for peak lactation cows when intake is limited by fiber.

- ✓ Potential use in rations for dry cows and heifers due to lower energy content.

NEW HOLLAND

Criteria for selecting an alfalfa variety or corn hybrid:

- What genetic traits are available that I need?
- How has the variety/hybrid performed in yield trials?
- For corn, what relative maturity do I need?
- For alfalfa, what are the disease resistance and persistence ratings for the variety?

Everett Thomas
Miner Institute/Oak Point Agronomics

Criteria for selecting a grass:

- What does the local feed mill have in stock?
- What's cheap?
- What did I plant last time?
- What did my father/grandfather plant?

Everett Thomas
Miner Institute/Oak Point Agronomics

http://www.uwex.edu/ces/crops/uwforage/uwforage.htm
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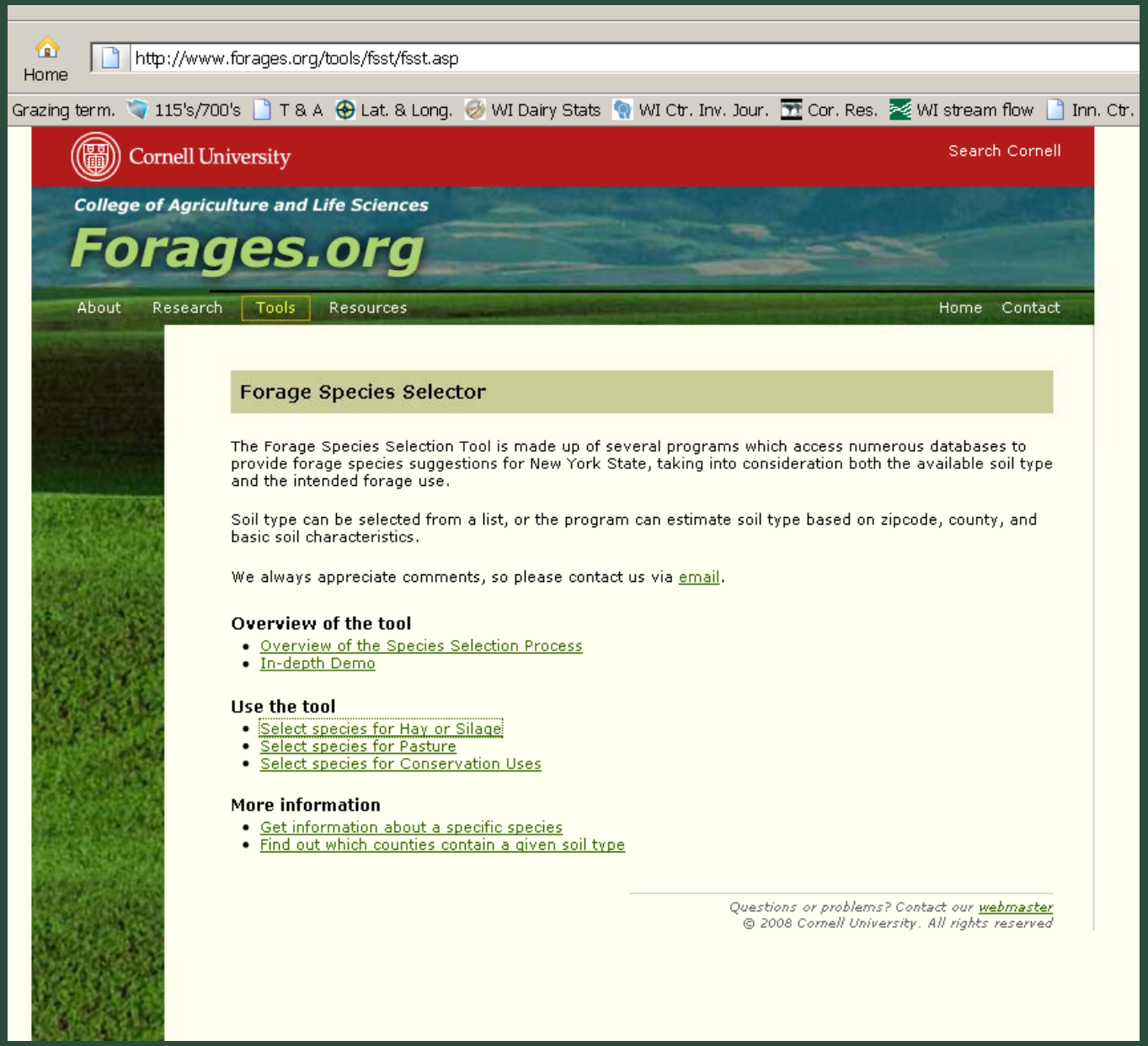
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Forage Species Selector
The Forage Species Selection Tool is made up of several programs which access numerous databases to provide forage species suggestions for New York State, taking into consideration both the available soil type and the intended forage use.
Soil type can be selected from a list, or the program can estimate soil type based on zipcode, county, and basic soil characteristics.
We always appreciate comments, so please contact us via email.
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Overview of the Species Selection Process
In-depth Demo
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3) Selecting a species and variety

(University of Wisconsin yield trials; southcentral Wisconsin)

Species	Winter survival	Tolerance of poor drainage	Yield (T/A/yr)
Reed canarygrass	superior	superior	**6.6**
Meadow bromegrass	superior	fair	**6.3**
Tall fescue	good	superior	**6.6**
Smooth bromegrass [1]	good	none	**5.9**
Timothy [2]	good	good	**5.3**
Meadow fescue	good	good	**5.0**
Orchardgrass	fair - good	poor	**6.4**
Festulolium	poor - fair	poor	**5.3**
Perennial ryegrass	poor	fair	**4.7**
Italian ryegrass	none	poor	**4.1**

[1] *60 to 70% of annual yield produced in first cut.*
[2] *Poor tolerance to heat and drought.*

Choose varieties with:

- ✓ a name.
- ✓ medium to late maturity for maximum flexibility in scheduling harvest.
- ✓ rust resistance to avoid forage quality and palatability problems.

Attaining successful establishment:

- ✓ Follow seeding rates recommended by a university.
- ✓ More persistent grass may be sown with less persistent grass for faster cover and improved seeding year yield.
  - Example: tall fescue or orchardgrass @ 10 lb/acre and Italian ryegrass or Festulolium @ 2 lb/acre
- ✓ Seed in spring (April to May) or summer (July to August) into firm, prepared seedbed.
- ✓ Depth = ¼ to ¾ in, depending on seed size.
- ✓ Apply 30 - 40 lb N/acre when seedlings are 4 - 6 in. tall.
- ✓ Control broadleaf weeds with herbicides and annual grass weeds by frequent clipping in the establishment year.

4) Harvest, Fertilization, and Storage

Cutting height effects on grass hay yield (3 cuts/year, mean of 2 years at Lancaster and Marshfield, WI).

Cutting height	Yield (lb/acre/yr)
2”	6900
4”	5400
Difference	**1500**

Brink et al., 2010

Orchardgrass after 2 years

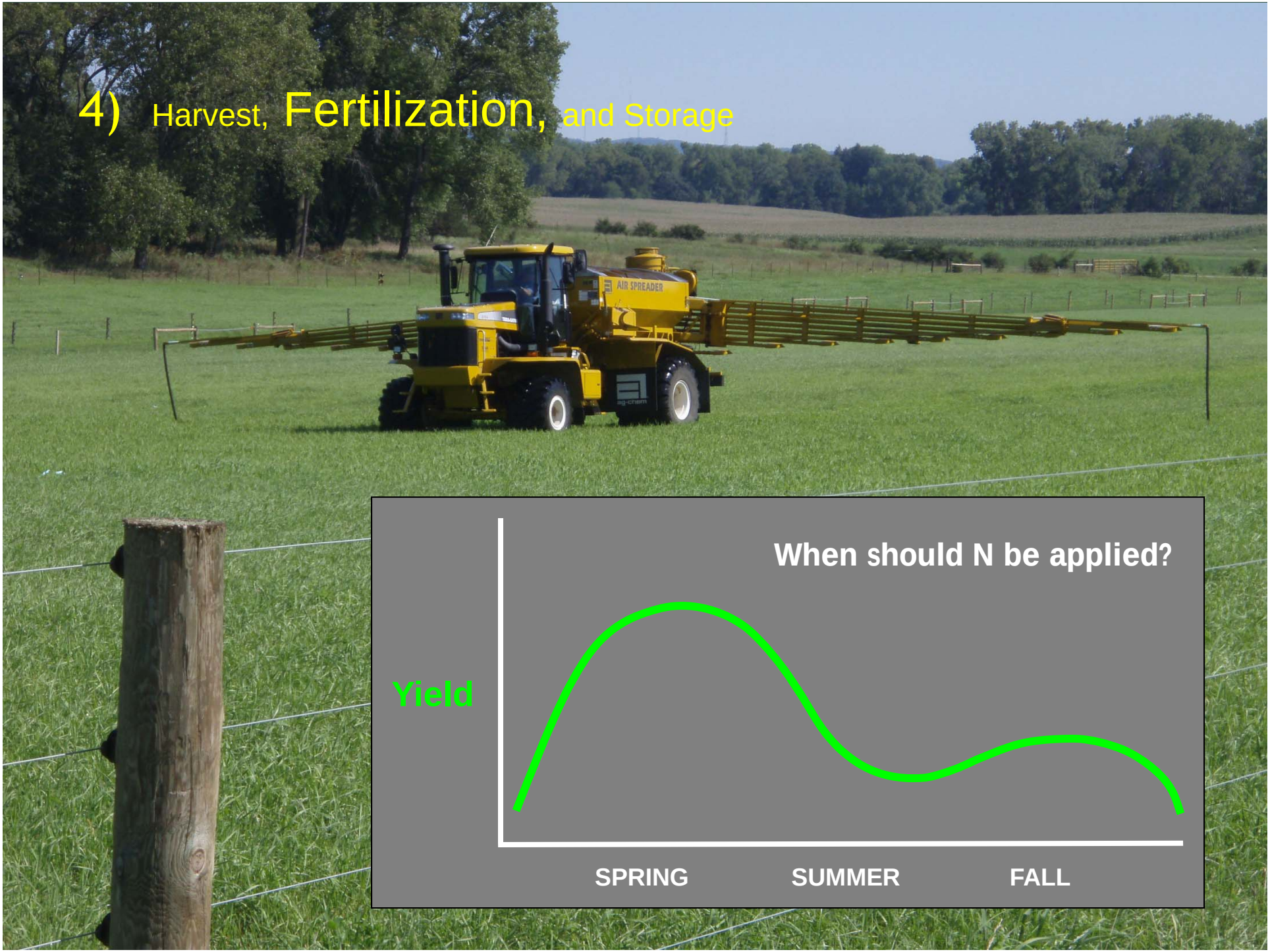
4” stubble

2” stubble

Cutting height for hay:

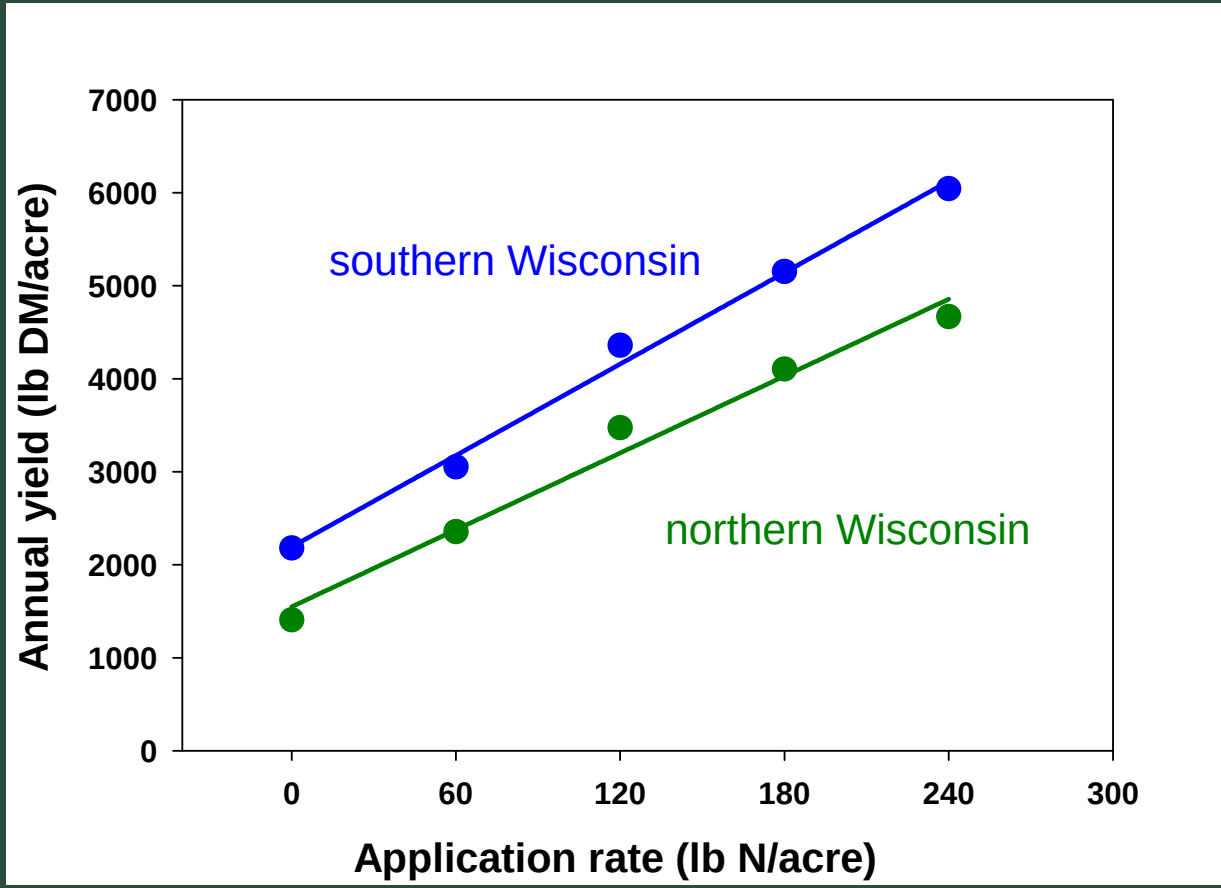
- ✓ If stand persistence is important, leave adequate stubble (≈ 4 in.).
- ✓ If grass will be rotated in 2 or 3 years, don't worry about stubble height.

4) Harvest, Fertilization, and Storage



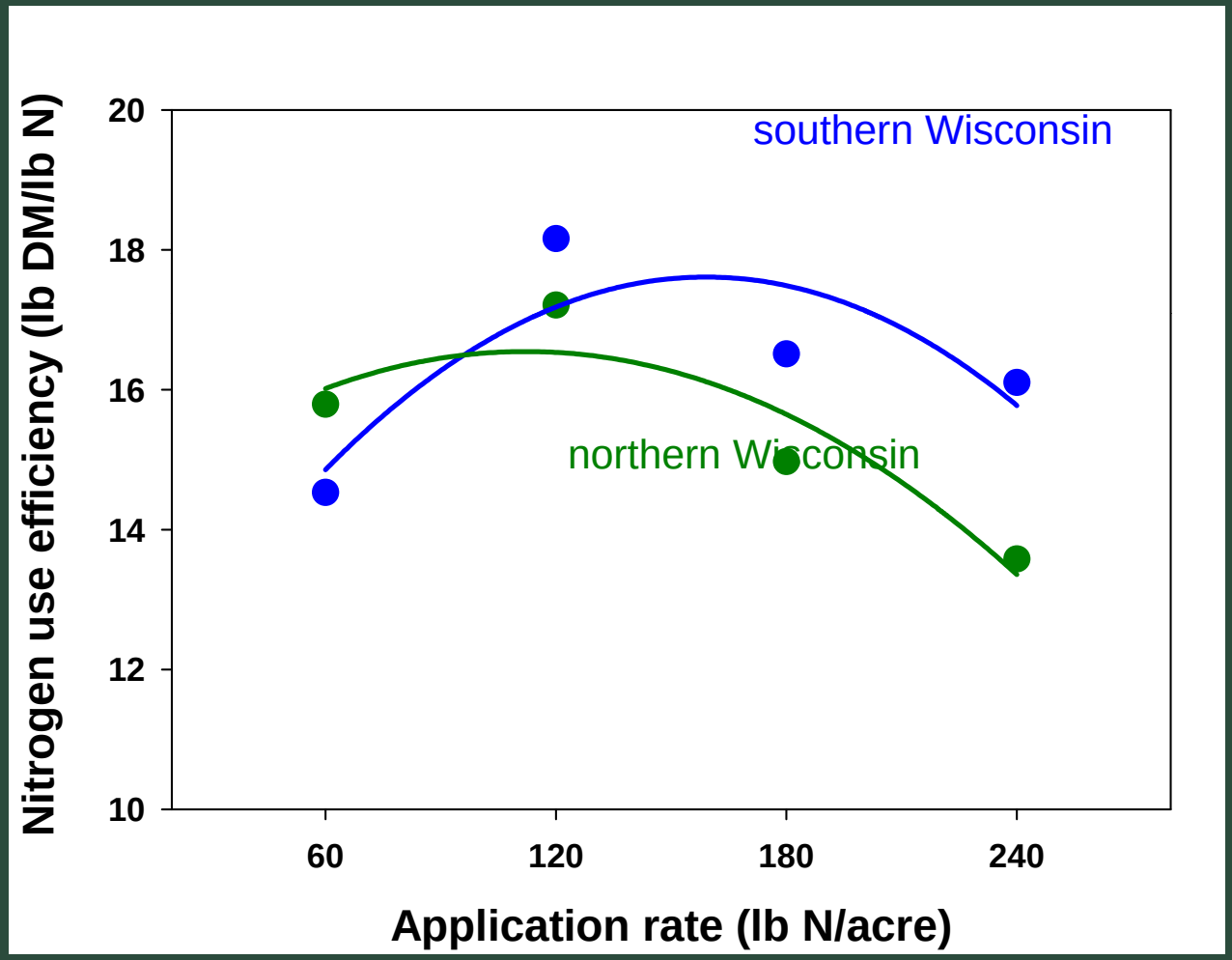
How much N should be applied?

Response of orchardgrass, tall fescue, and meadow fescue to N application rate at two locations.

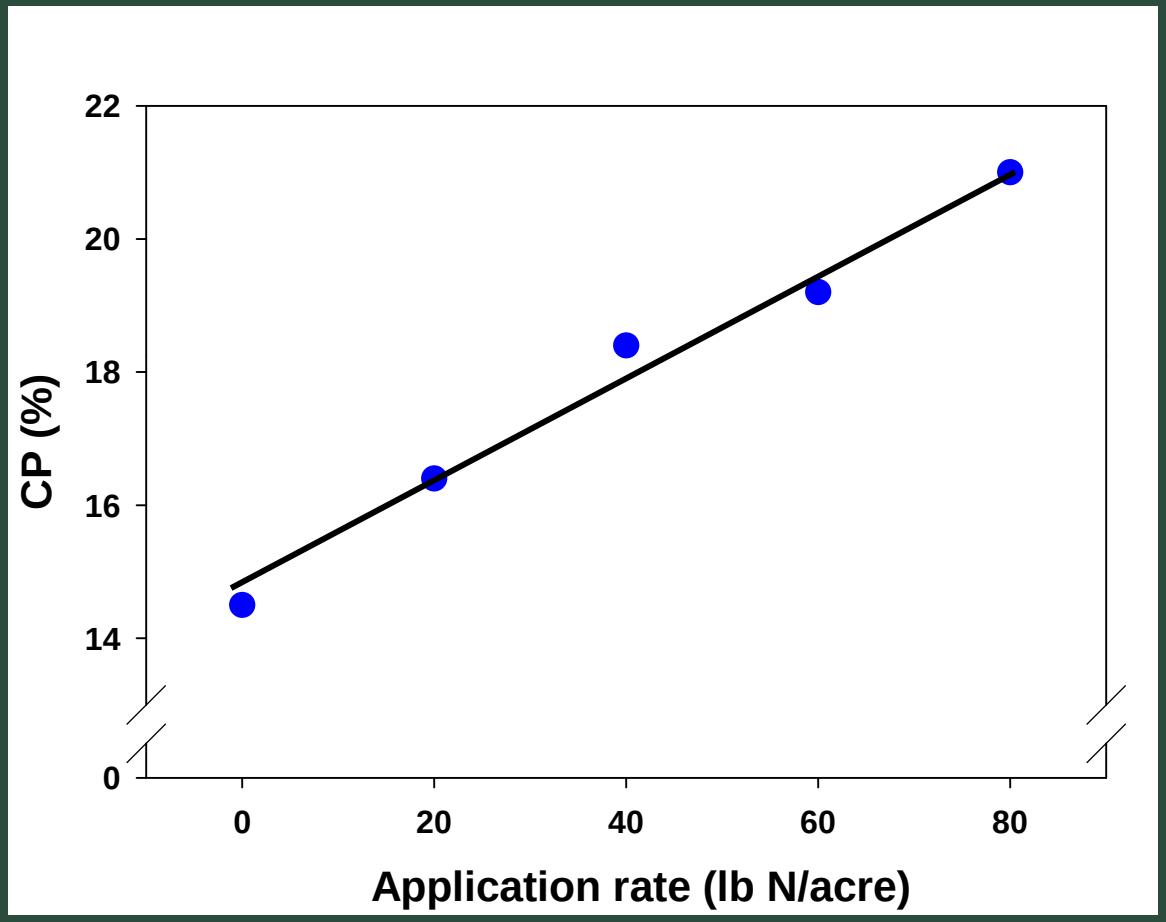


Brink et al., 2010

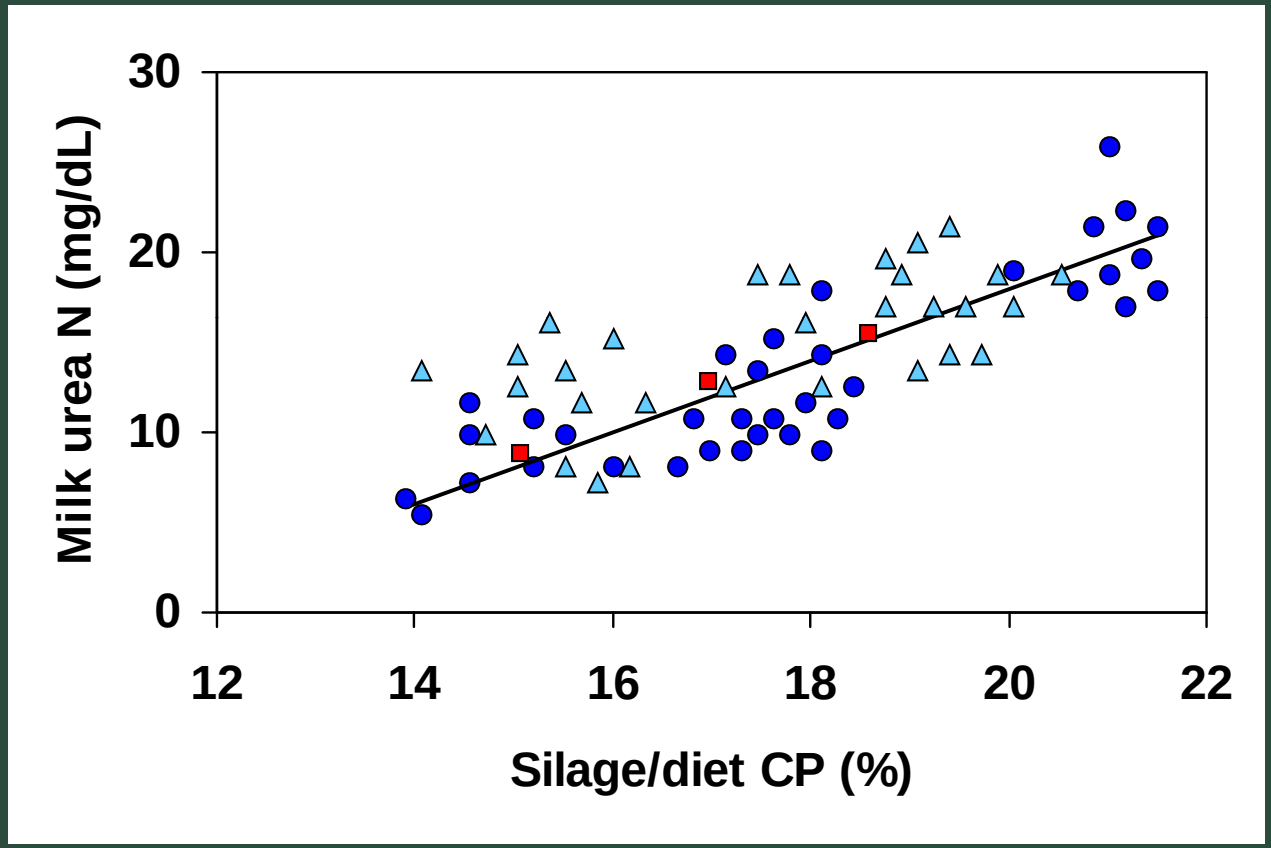
Efficiency of yield production.



Forage protein concentration.



Milk urea N of cows fed ryegrass silage (● ▲) or TMR (■) with increasing CP.



Tas, 2006
Broderick, 2003

Recommendations for N application:

- ✓ Applications made in early spring before and after the first harvest have the greatest impact on yield
- ✓ Maximum annual rate = 120 - 150 lb/acre.
- ✓ Split-apply, with no more than 60 lb N/acre per application for greater utilization efficiency by the crop and cows.

The issue of K (potassium) concentration in grasses:

- High dietary K levels raise blood pH, which interferes with Ca absorption from feed and mobilization from bones that occurs before freshening.
- Milk fever (hypocalcemia, or low blood Ca) affects about 6% of freshening cows.
  - ✓ Reduce dietary K three weeks prior to calving to reduce milk fever incidence.

Managing grasses to reduce K concentration:

- ✓ If possible, grow on low-medium K soils.
- ✓ Feed 1st cutting to heifers and dry cows (K conc. is highest in spring).
- ✓ Apply manure after 1st cut.
- ✓ Orchardgrass and perennial ryegrass have highest K.

4) Harvest, Fertilization, and Storage

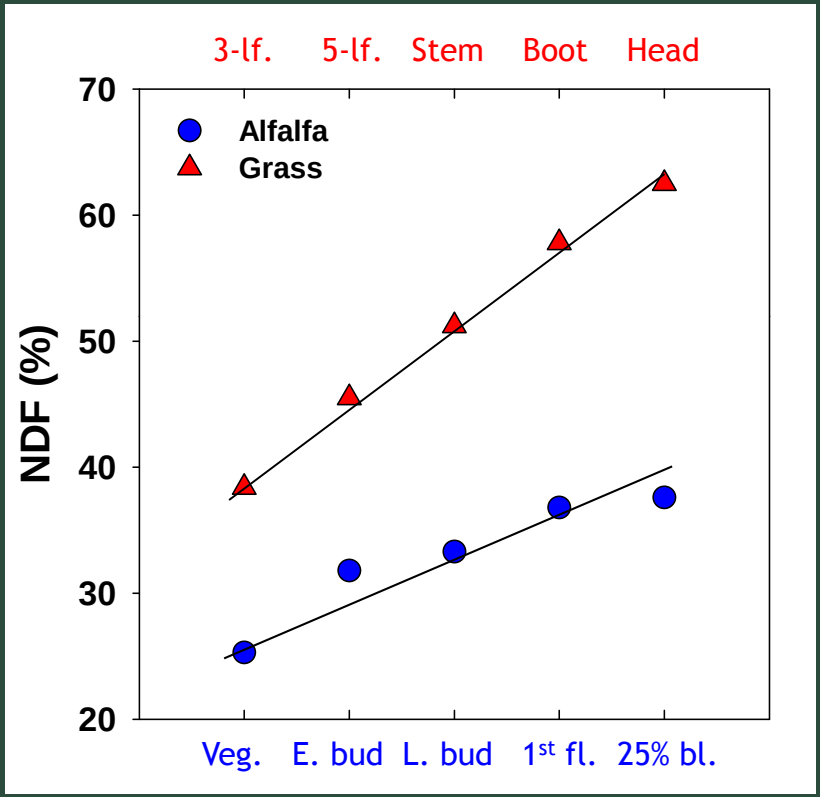
- ✓ Ensile at 60 – 65% moisture.
- ✓ Grass dries faster than alfalfa, so monitor moisture.
  - Don't judge by feel (a "soft" feel does not mean it's wet).
- ✓ Compaction is critical to making good grass silage.
  - At equal moisture and packing, density of grass silage is generally less than alfalfa.
- ✓ Silage inoculants have been shown to be beneficial, but are not a substitute for good management.

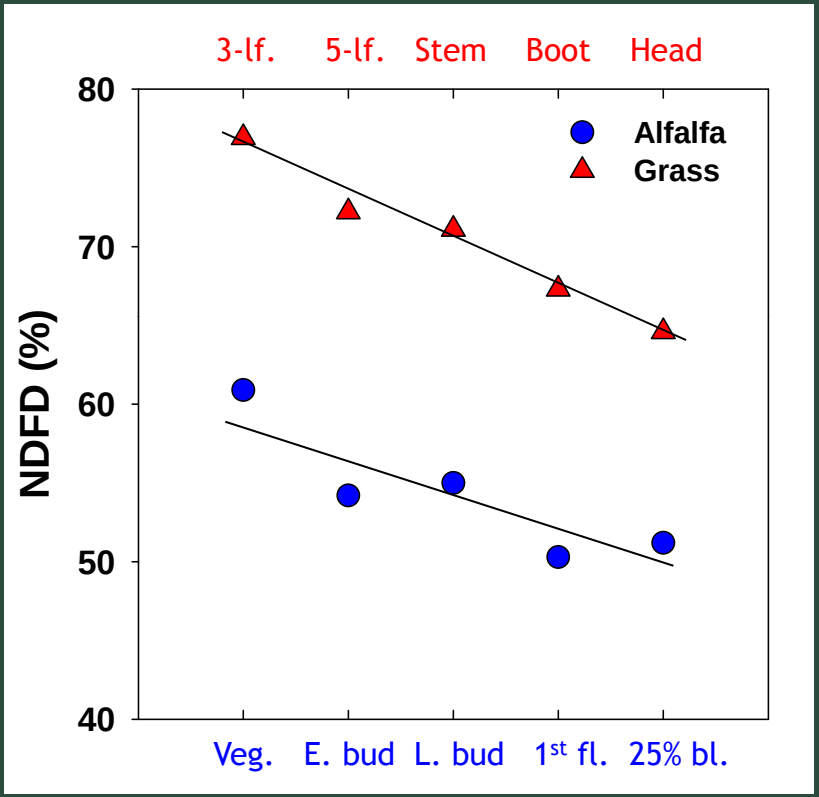
5) Forage quality considerations

- Quality of grasses is inherently lower than that of alfalfa, and declines more rapidly during the spring.
  - "We cut alfalfa according to standards established in the 1980's and 90's, but cut grasses according to standards established in the 1940's and 50's."

Dave Mertens

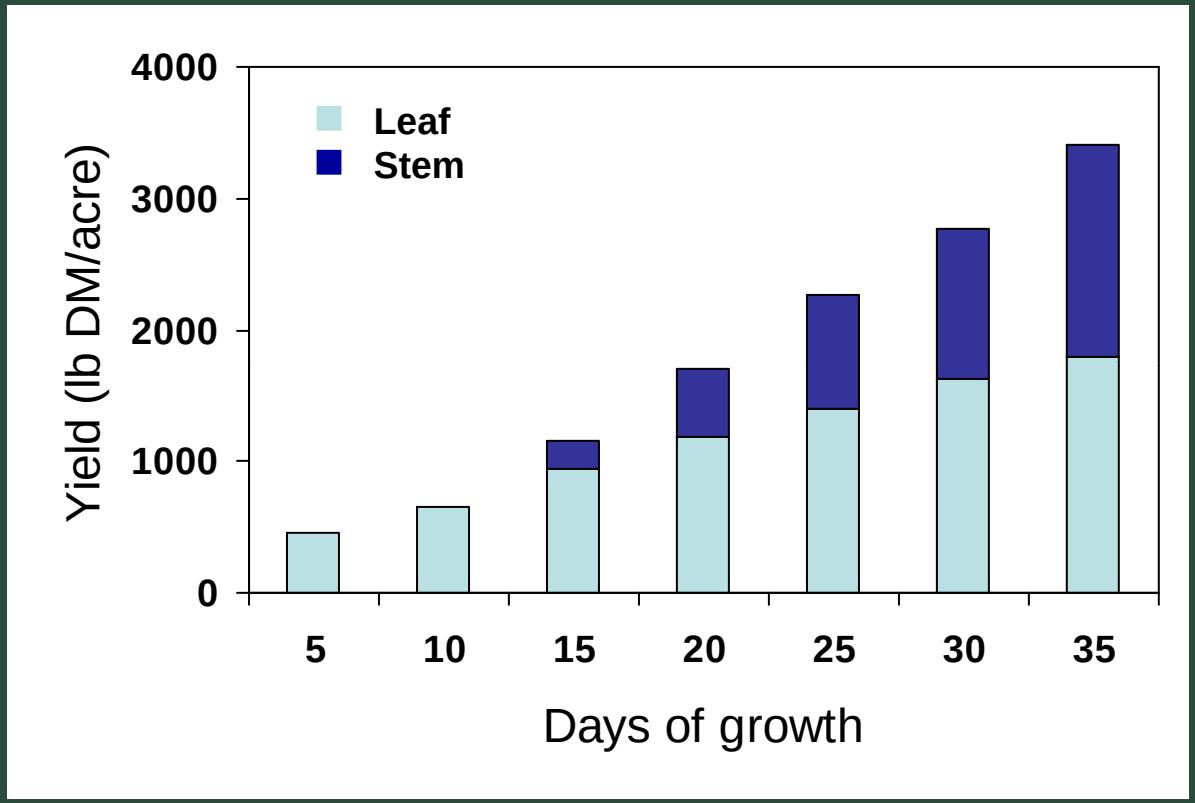
NDF and NDFD of alfalfa vs. grass





Brink and Casler, 2005
Brink et al., 2010

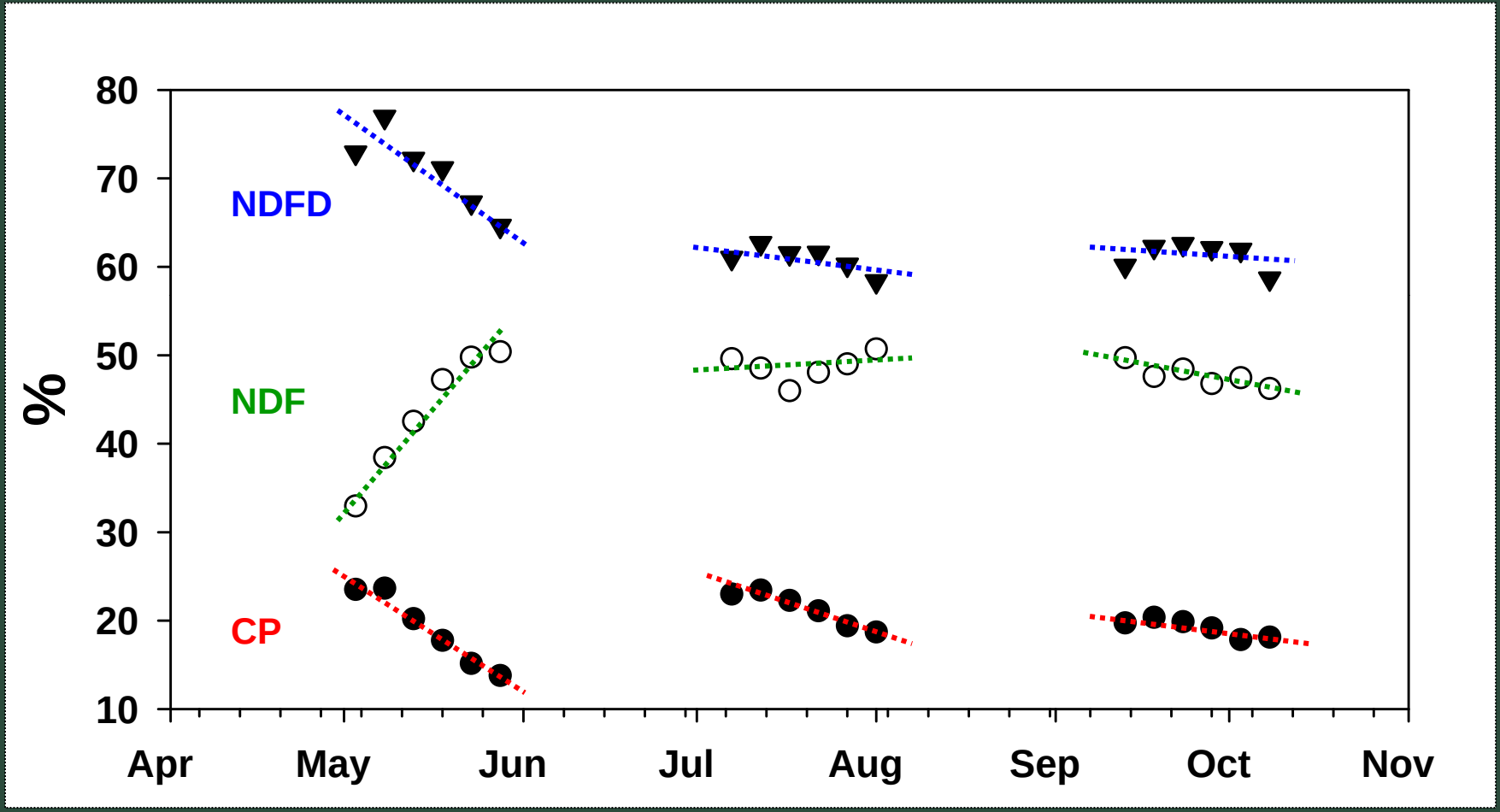
Spring yield relationships



Brink and Casler, 2005

Boot stage

Seasonal differences in grass quality



Brink and Casler, 2005

Cutting management:

- ✓ Know the optimum forage NDF for the class of livestock being fed.
- ✓ For dairy-quality forage, harvest at boot stage in spring.
  - Quality is greatest in spring, but declines more rapidly.
- ✓ Summer and fall harvest can be delayed due to slower decline in quality.

Summary:

1. **Decide how producing grass fits into your farm management and how feeding grass forage fits into your herd's ration.**
2. **Grow and manage grasses like you would alfalfa.**
   - **Attention to detail during establishment and harvest results in productive stands having the potential to provide high quality forage appropriate for dairy diets.**

Questions?

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www.ars.usda.gov/mwa/madison/dfrc

Or “google” dairy forage research