


Tuesday March 18, 2014

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## UNDERSTANDING FORAGE QUALITY AND DRY MATTER INTAKE



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## Grazing Dairy Farms

- Among grazing dairy farms in Michigan ....
  - 15% provided little or no supplemental feeds during the grazing season
  - 38% used a pTMR or concentrate to supplement pasture
  - 47% provided the majority of feed as a TMR while still allowing cows access to pasture



Haan et al., 2011

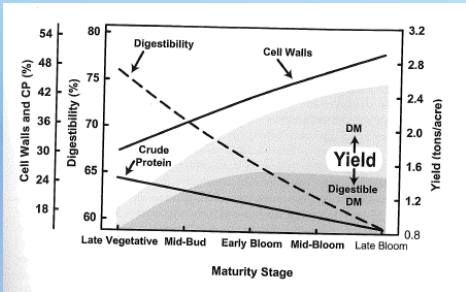
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## Factors that affect Forage Quality

- Species / variety
- Soil fertility
- Fertilization
- Growth and maturity
- Season
- Pasture management

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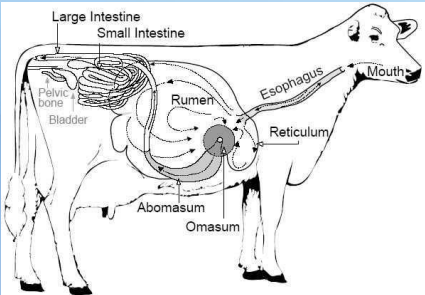
## Quality vs. Quantity



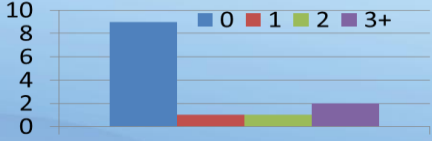
Barnes et al., 2003. Forages: An Introduction to Grassland Agriculture, 6th Edition. Iowa State Press, Ames, IA.

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## What is forage quality?



## Pasture Sampling on Grazing Dairy Farms



Times per year pasture sampled for nutrient composition.


Soder and Muller, 2007

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## Forage Sampling

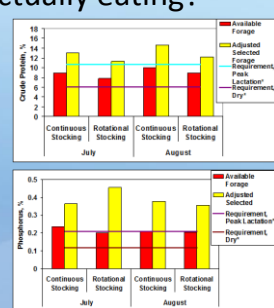
- Collect a representative sample
  - 25 to 30 locations
  - Sample what cows are eating (as best you can)



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## What are cows actually eating?

- %CP of selected forage was 44% greater than that of available forage
- %P of selected forage was 87% greater than that of available forage

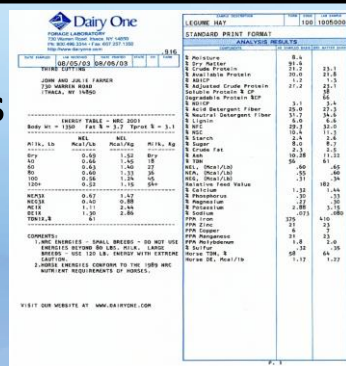


National Research Council (NRC). 1996. Nutrient Requirements of Beef Cattle. National Academy Press. Washington, D.C.

Haan, 2008

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## Forage Analyses

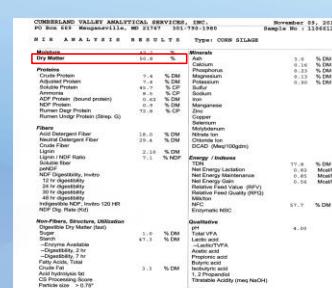


Visit our website at www.dairyone.com

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## Forage Analyses: Dry Matter

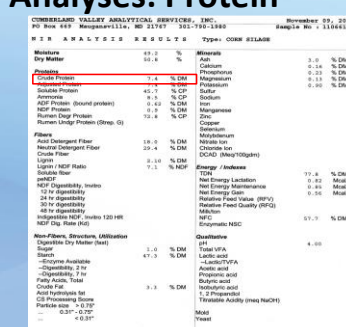
- When all the water is removed from the forage what remains is the "dry matter"



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## Forage Analyses: Protein

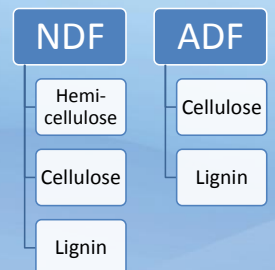

- Crude Protein
  - Most common measurement of protein
  - CP = Nitrogen Content X 6.25
  - Tells you nothing about rumen degradability of protein or amino acid concentration



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## Forage Analyses: Carbohydrates

### Structural Carbohydrates

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## Forage Analyses: Carbohydrates

- **Neutral Detergent Fiber**
  - Can be well digested in rumen depending on other dietary factors
  - Increases with plant maturity
  - High NDF in forages
    - Increases rumen fill
    - Decreases passage rate
    - Decreases dry matter intake

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## Forage Analyses: Carbohydrates

- **Acid Detergent Fiber**
  - Moderately digested in the rumen
  - Relates to the extent of digestion of the forage
  - Higher the value the less of the forage is digested

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## Forage Analyses: Carbohydrates

- **Lignin**
  - Completely indigestible to rumen microbes and cow
  - High values will decrease NDF digestibility

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## Forage Analyses: Carbohydrates

- **Non-Structural Carbohydrates**
  - starch, sucrose, and fructans
  - Can be lost during respiration when forages are not immediately stored properly
  - **Starch**
    - 2 – 5% in legumes
    - 1 – 3% in grasses
    - 25 – 40% in corn silage

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## How do your animals graze?

- **Cattle**
  - Middle and above grazers
  - Sometimes spot grazers
- **Sheep**
  - Low grazers
  - Overgraze
- **Llamas/Alpacas**
  - Grazers & Browsers
- **Goats**
  - Browsers

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## Animal Production Goal

Milk Production	Intake, % BW	Intake, lb DM	Intake, lb Fresh Wt	Bite Size	Grazing Time, min
40	2.8	36.4	243	.019	481
50	3.1	40.3	269	.021	533
60	3.4	44.2	295	.023	584
70	3.6	46.8	312	.024	619
80	3.8	49.4	329	.026	653
90	4.1	53.3	355	.030	756
100	4.4	57.2	416	.032	825

Daily Pasture Intake for 1300 lb. Dairy Cow

## Dry Matter Intake

- Factors limiting DMI

- Physiological
- Environmental
- Management

- Pasture DMI =

$$\text{grazing time} \times \text{bite rate} \times \text{bite mass}$$



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## Forage Quality for Livestock

- Forage Goal: produce a desired animal response

- Palatable
- Digestibility
- Nutrient Content
- Negative Quality Factors



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## Palatability

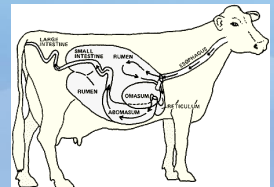
- Based on smell, feel, taste, ...
- Influenced by texture, fertilization, moisture
- High quality= highly palatable



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## Digestibility

- Forage is absorbed as it passes through tract
- Varies greatly
- Depends on maturity, etc



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## Nutrient Content

- Adequate level of nutrients

- Protein
- Fiber
- Energy
- Minerals

- May need to supplement

- For total ration
- Minerals



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## Negative quality factors

- Lower performance
- Cause sickness
- Cause death



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<http://extension.psu.edu/animals/dairy/health/nutrition/forages/pasture/articles-on-pasture-and-grazing>