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## Right Quality vs High Quality Forages

Mary Beth Hall

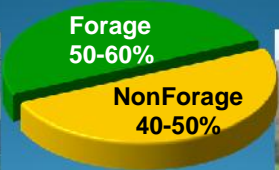


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USDA Agricultural Research Service

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## Forage In Dairy Cow Rations




- What cows are designed to use
- Include as much forage as possible
- Meet requirements

14 herds, 28,600 – 36,960 kg RHA

Shaver and Kaiser, 2011

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Forage quality sets limits for amount of forage fed and production.  
We must balance rations without breaking rules.

You can't push a cow to produce.....

....But you can get the obstacles out of her way so she can.

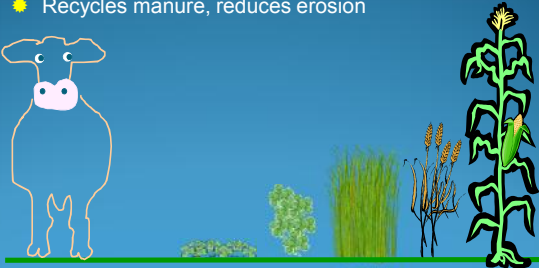
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## What Do Forages Do?

- Nutrients to meet requirements
- Physical form for healthy gut function
- They are & make good use of farm resources
- Recycles manure, reduces erosion



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### Which Is High Quality Forage?




Alfalfa



Grass

Corn Silage

Straw


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### Which Is The Best Screwdriver?

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### What Is "Quality"?



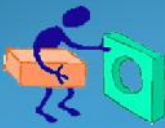
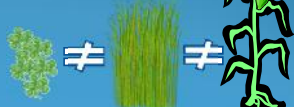
- "Quality": how a feed complements the rest of the ration to meet cow needs.
- Not High or Low, but **Right** Quality
- What fits the need?

Composition

Digestibility


Form

Amount




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### Form: Physically Effective Fiber




- Enhances rumen function
- Increases rumination
- Reduces rumen acidosis
- Rumen retention & passage
- Allows rations to work

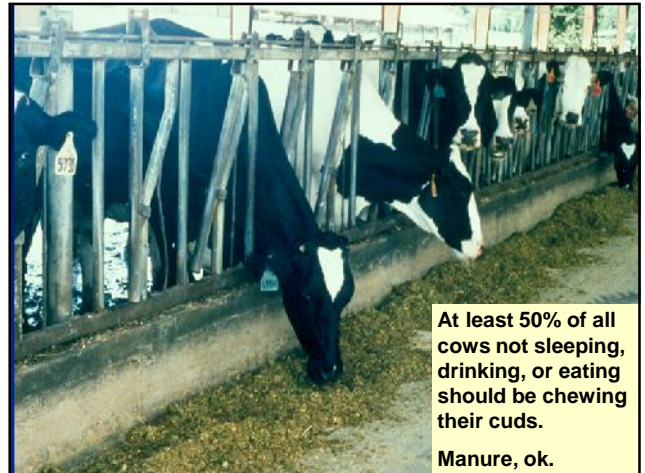
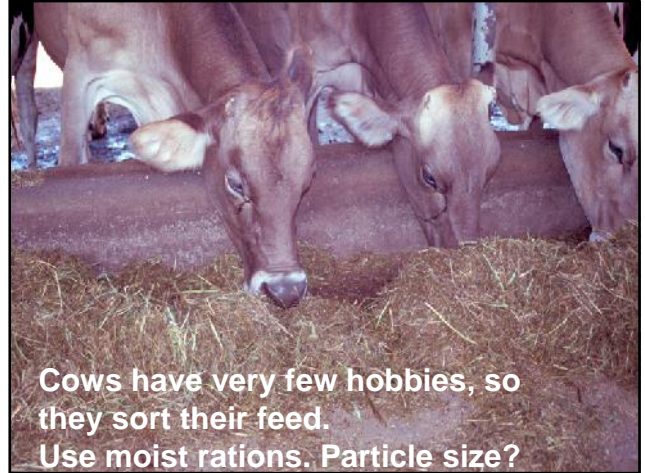
Affected by particle size, digestion, density, hydration, "softness" .....

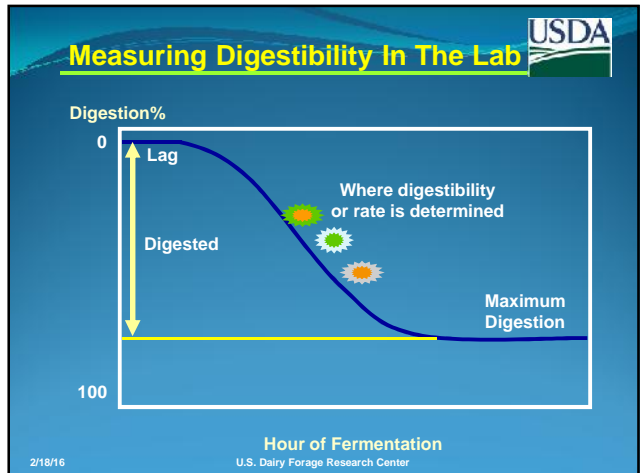
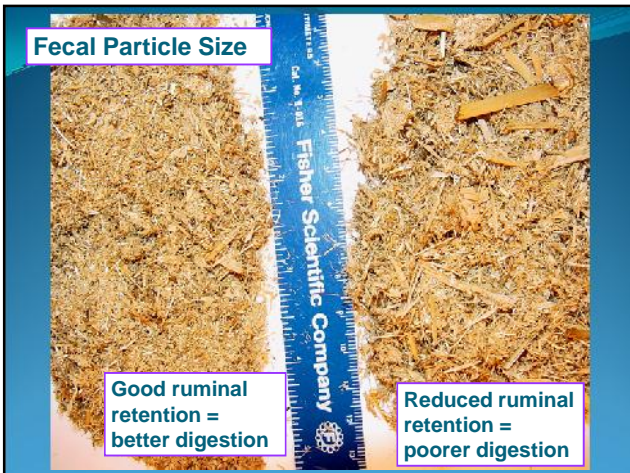




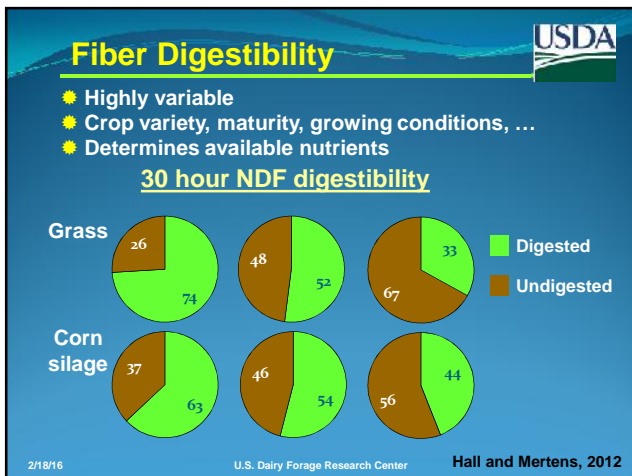
Fine Medium Coarse



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### Fiber Digestibility

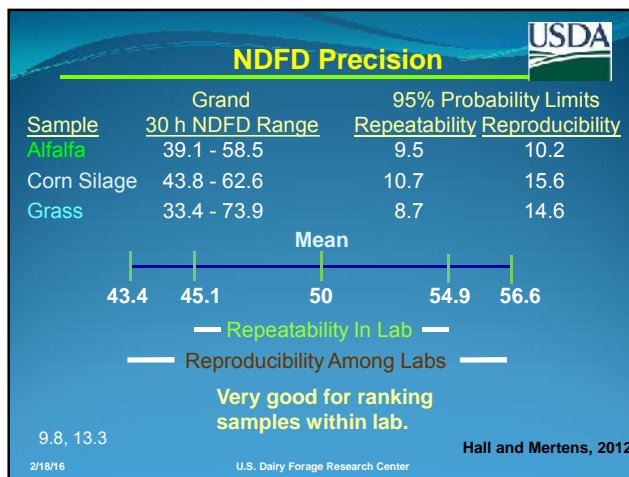
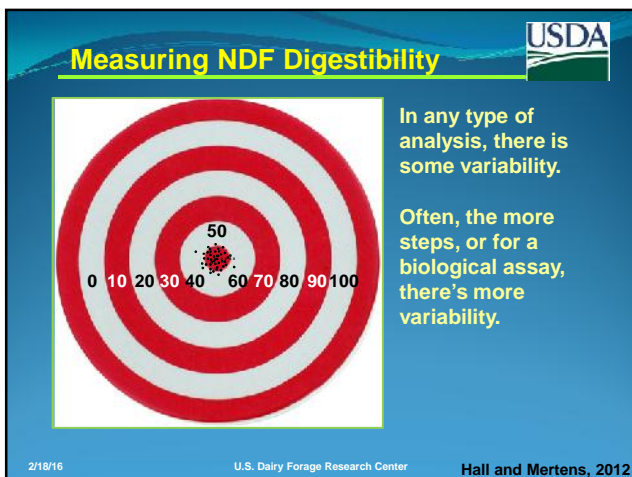
How rapidly digestible a feed is affects

- How quickly a cow gets the nutrients
- How quickly feed breaks down & leaves the rumen


## So....

Will a rapidly fermenting forage probably have more or less effective fiber value than one that ferments more slowly?

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### Composition



**Water Soluble Carbohydrates**

Fresh forages/hays  
Temperate grasses  
Almond hulls  
Bakery waste  
Beet & citrus pulps  
Molasses  
Whey products

**Soluble Fiber**

Legume forages  
Beet & citrus pulps

**Starch**

Grain silages  
Corn, sorghum  
Small grains  
Bakery waste  
Wheat midds  
Potatoes  
cull/waste

**Fiber**

Forages  
Crop residues  
Nonforage fiber sources  
Wheat middlings  
Corn gluten feed

**Protein**

Legume forages  
Soy & Canola  
Corn gluten meal

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### Eaten Doesn't Mean Digested






Poorly chopped/processed corn silage




Coarse corn meal


1911  
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### Body Condition Changes






OK?  
Depending on days in milk....



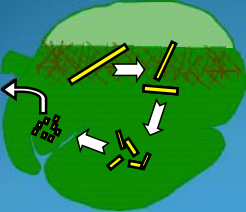
Too Thin.

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### Forage: Current Recommendations




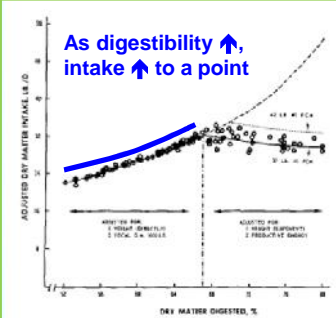
	Min. Forage NDF	Min. Dietary NDF	Max. Dietary NFC
Composition	19	25	44
Physical form	18	27	42
Digestibility	17	29	40
	16	31	38
	15	33	36



- NDF from Forage as 0.9 to 1% of body weight (Mertens)
- 75% NDF from forage

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### (In)Digestibility and Intake

There's only so much undigestible material a cow can fit in her rumen/gut!


Undigestible feed limits intake.

NDF is the least digestible part of the diet.

Bigger pieces of feed cannot pass until they are digested & ruminated to reduce their size.

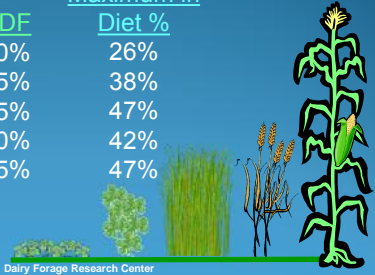
Conrad et al., 1964, J. Dairy Sci. 47:54      Conrad, 1966, J. Anim. Sci. 25:227

### How Much Can You Feed?




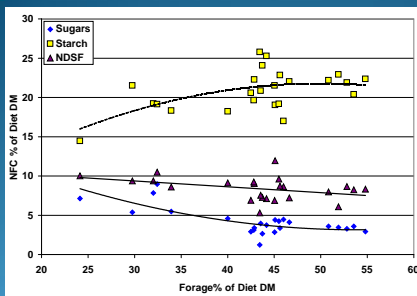
Starting Point: 28% NDF in the ration  
 Allowable fNDF = 28% x 75% from forage = 21%  
 Allowable Forage = Allowable NDF% / Forage NDF%

	Forage NDF	Maximum in Diet %
Straw	80%	26%
Barley Silage	55%	38%
Alfalfa Silage	45%	47%
50:50 Barley:Alf	50%	42%
Corn Silage	45%	47%



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### Formulating For NFC


5% WSC  
 25% starch  
 7% soluble fiber  
 Allowable starch relative to amount of forage/effective fiber?

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### Moldy Feed / Mycotoxins



What is the costs of preventably sick cows?




Spoilage

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### Sorting This Out On The Farm

- ☀ Balance first with forages. They dictate the ration's base.
- ☀ Aim to meet cow fiber & energy needs within bounds of present recommendations.
- ☀ ...Then work with the cows to figure out the details.




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### Sorting This Out On The Farm



- ☀ Things you can evaluate
  - Digestibility and composition
  - Particle size & sorting
  - Rumination and manure evaluation
  - Intake, performance, and feed efficiency
  - Body condition score change



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## Questions?



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