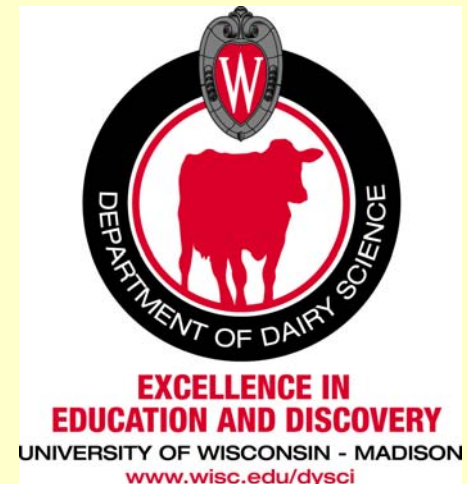


# Feeding Grass or Alfalfa-Grass Silage to Dairy Cows

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# ➤ DMI related to NDF & IVNDFD



# NDF Content of Grass or Legume Silage

Dairy NRC, 2001

<u>DM Basis</u>	<u>Average</u>
Early Cut	
Grass	51%
Legume	37%
Mid Cut	
Grass	58%
Legume	43%
Late Cut	
Grass	67%
Legume	50%

# CP & NDF Contents of Grass-Legume Silages

(Predominantly Legume)

Dairy NRC, 2001

<u>DM Basis</u>	<u>1 Std Dev</u>	<u>Average</u>	<u>1 Std Dev</u>
CP			
Early Cut	18%	<b>20%</b>	22%
Late Cut	16%	<b>18%</b>	20%
NDF			
Early Cut	40%	<b>42%</b>	44%
Late Cut	51%	<b>54%</b>	57%

# CP & NDF Contents of Grass-Legume Silages

(Mixed)

Dairy NRC, 2001

<u>DM Basis</u>	<u>1 Std Dev</u>	<u>Average</u>	<u>1 Std Dev</u>
CP			
Early Cut	16%	<b>20%</b>	24%
Late Cut	15%	<b>17%</b>	19%
NDF			
Early Cut	44%	<b>45%</b>	46%
Late Cut	54%	<b>57%</b>	60%

# CP & NDF Contents of Grass-Legume Silages

(Predominantly Grass)

Dairy NRC, 2001

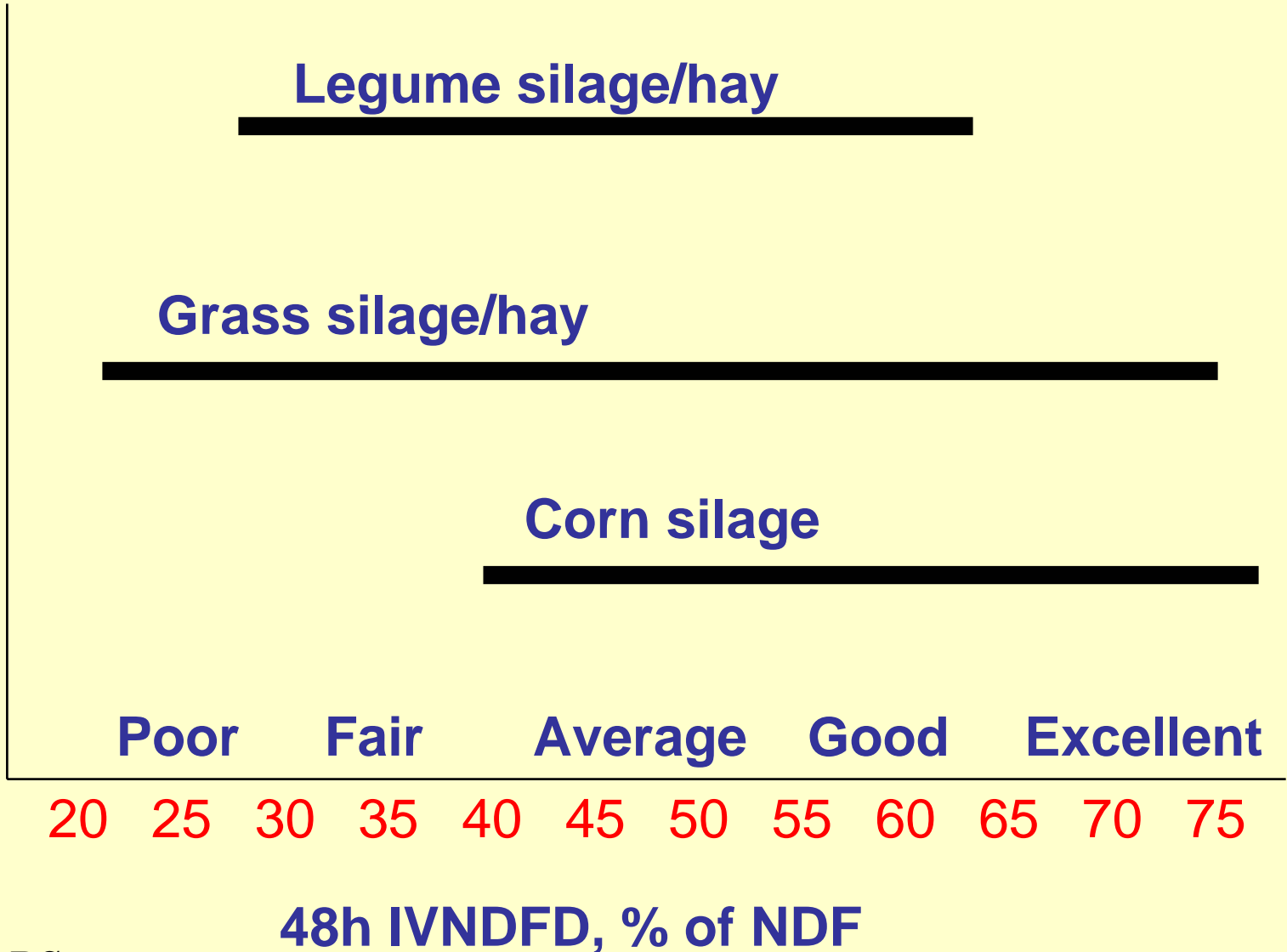
<u>DM Basis</u>	<u>1 Std Dev</u>	<u>Average</u>	<u>1 Std Dev</u>
CP			
Early Cut	16%	<b>18%</b>	20%
Late Cut	13%	<b>15%</b>	17%
NDF			
Early Cut	49%	<b>50%</b>	51%
Late Cut	58%	<b>62%</b>	66%

# Lignin Content of Grass-Legume Silages

Dairy NRC, 2001

<u>DM Basis</u>	<u>Average</u>
Predominantly Grass	
Early Cut	<b>5.0%</b>
Late Cut	<b>6.5%</b>
Mixed	
Early Cut	<b>5.8%</b>
Late Cut	<b>7.1%</b>
Predominantly Legume	
Early Cut	<b>6.7%</b>
Late Cut	<b>8.4%</b>

# Forage IVNDFD Variation



# Forage IVNDFD Variation

Chase, 2003 (Dairy One)

<u>Forage</u>	<u>IVNDFD (% of NDF)<sup>1</sup></u>
Legumes	34 – 57
Grasses	41 – 70
Corn Silage	45 - 64

<sup>1</sup>30-h IVNDF

# TDN Content of Grass-Legume Silages

Dairy NRC, 2001

<u>DM Basis</u>	<u>Average</u>
Predominantly Grass	
Early Cut	<b>61%</b>
Late Cut	<b>54%</b>
Mixed	
Early Cut	<b>60%</b>
Late Cut	<b>54%</b>
Predominantly Legume	
Early Cut	<b>57%</b>
Late Cut	<b>52%</b>

# ➤ TDNI more related to DMI than TDN%



➤ DMI related to digestion rate



# Digestion Rate for Alfalfa or Grasses

Hoffman & co-workers, JDS, 1993

<u>DM Basis</u>	<u>DMD Rate</u>	<u>NDFD Rate</u>
Alfalfa, late bud	16%/h	9%/h
Bromegrass, boot	5%/h	5%/h
Orchardgrass, boot	8%/h	7%/h
Perennial Ryegrass, boot	9%/h	7%/h
Timothy, boot	5%/h	3%/h

# What do the research cows say?



# Ryegrass Silage vs. Alfalfa Silage

Hoffman & co-workers, JDS, 1998

<u>Nutrient</u>	<u>Ryegrass Silage</u>	<u>Alfalfa Silage</u>
Forage CP%	18	20
Forage NDF%	47	44
Diet NDF%	37	36
Diet Forage%	68	70

**Late bud alfalfa and boot ryegrass**

# Ryegrass Silage vs. Alfalfa Silage

Hoffman & co-workers, JDS, 1998

<u>Nutrient</u>	<u>Ryegrass Silage</u>	<u>Alfalfa Silage</u>
DM Intake, lb/d	45 <sup>b</sup>	50 <sup>a</sup>
Milk Yield, lb/d	66 <sup>b</sup>	70 <sup>a</sup>
FCM, lb/d	64	66
Milk/DMI	1.47	1.43
FCM/DMI	1.42	1.32

**Early lactation cows**

# Orchardgrass Silage vs. Alfalfa Silage

Weiss & Shockey, JDS, 1991

<u>Nutrient</u>	<u>Orchardgrass Silage</u>	<u>Alfalfa Silage</u>
Forage CP%	22	22
Forage NDF%	53	40
Diet NDF%	31, 39, 46	26, 31, 35
Diet Forage%	40, 60, 80	40, 60, 80

**Late bud alfalfa and boot orchardgrass**

# Orchardgrass Silage vs. Alfalfa Silage

Weiss & Shockey, JDS, 1991

**80% forage diets**

<u>Nutrient</u>	<u>Orchardgrass Silage</u>	<u>Alfalfa Silage</u>
DM Intake, lb/d	38	47
TDN Intake, lb/d	25	30
Milk Yield, lb/d	47	53
FCM, lb/d	43	51

**Mid lactation cows**

# Orchardgrass Silage vs. Alfalfa Silage

Weiss & Shockey, JDS, 1991

**60% forage diets**

<u>Nutrient</u>	<u>Orchardgrass Silage</u>	<u>Alfalfa Silage</u>
DM Intake, lb/d	45	49
TDN Intake, lb/d	30	31
Milk Yield, lb/d	59	61
FCM, lb/d	52	52

**Mid lactation cows**

# Orchardgrass Silage vs. Alfalfa Silage

Weiss & Shockey, JDS, 1991

**40% forage diets**

<u>Nutrient</u>	<u>Orchardgrass Silage</u>	<u>Alfalfa Silage</u>
DM Intake, lb/d	48	51
TDN Intake, lb/d	33	33
Milk Yield, lb/d	59	61
FCM, lb/d	51	53

**Mid lactation cows**

# Orchardgrass Silage vs. Alfalfa Silage

Cherney & coworkers, PAS, 2002

<u>Nutrient</u>	<u>Orchardgrass Silage</u>	<u>Alfalfa Silage</u>
Forage CP%	16	19
Forage NDF%	60	49
Diet NDF%	34	34
Diet Forage%	44	53

**Early flower alfalfa and early head orchardgrass**

# Orchardgrass Silage vs. Alfalfa Silage

Cherney & co-workers, PAS, 2002

<u>Nutrient</u>	<u>Orchardgrass Silage</u>	<u>Alfalfa Silage</u>
DM Intake, lb/d	44 <sup>b</sup>	46 <sup>a</sup>
Milk Yield, lb/d	72 <sup>b</sup>	76 <sup>a</sup>
FCM, lb/d	65 <sup>b</sup>	69 <sup>a</sup>

**Mid lactation cows**

# Orchardgrass Silage

Cherney & coworkers, PAS, 2002

<u>Nutrient</u>	<u>Boot</u>	<u>Head</u>
Forage CP%	18	18
Forage NDF%	51	56
Diet NDF%	37	39
Diet Forage%	48	44

# Orchardgrass Silage

Cherney & co-workers, PAS, 2002

<u>Nutrient</u>	<u>Boot</u>	<u>Head</u>
DM Intake, lb/d	45 <sup>a</sup>	38 <sup>b</sup>
Milk Yield, lb/d	78 <sup>a</sup>	70 <sup>b</sup>
FCM, lb/d	75 <sup>a</sup>	69 <sup>b</sup>

**Mid lactation cows**

# Tall Fescue Silage vs. Alfalfa Silage

Cherney & coworkers, AFGC, 2002

<u>Forage</u>	Tall Fescue <u>Silage</u>	Alfalfa <u>Silage</u>
CP%	17	23
NDF%	56	34

# Tall Fescue Silage vs. Alfalfa Silage

Cherney & coworkers, AFGC, 2002

<u>Diet</u>	<u>100% AS</u>	67%:33% <u>AS:TFS</u>	33%:67% <u>AS:TFS</u>	<u>100% TFS</u>
Forage %	84	70	59	51
NDF %	28	30	32	31

# Tall Fescue Silage vs. Alfalfa Silage

Cherney & coworkers, AFGC, 2002

<u>Diet</u>	<u>100% AS</u>	67%:33% <u>AS:TFS</u>	33%:67% <u>AS:TFS</u>	<u>100% TFS</u>
DMI, lb/d	45 <sup>b</sup>	46 <sup>b</sup>	52 <sup>a</sup>	54 <sup>a</sup>
Milk, lb/d	71 <sup>b</sup>	76 <sup>b</sup>	86 <sup>a</sup>	89 <sup>a</sup>
Fat, %	3.7	3.5	3.7	3.3
FCM, lb/d	68 <sup>b</sup>	70 <sup>b</sup>	82 <sup>a</sup>	80 <sup>a</sup>

# Summary/Conclusions/Perspectives

- ❑ > NDF% in grasses than legumes
- ❑ > Extent of NDF digestion in grasses, but slower rates of DM & NDF digestion compared to legumes
  - ❑ > TDN% for grasses
  - ❑ < Intake potential for grasses
- ❑ > NDF%, > lignin%, < IVNDFD, < DMI, & < milk yield when grasses or legumes cut late
- ❑ Cornell alfalfa vs. grass feeding trials confounded by > grain feeding in the grass-based diets
- ❑ Grass less forgiving when silage harvested too wet (<35% DM)
  - ❑ Clostridial spoilage
- ❑ Agronomic benefits?