

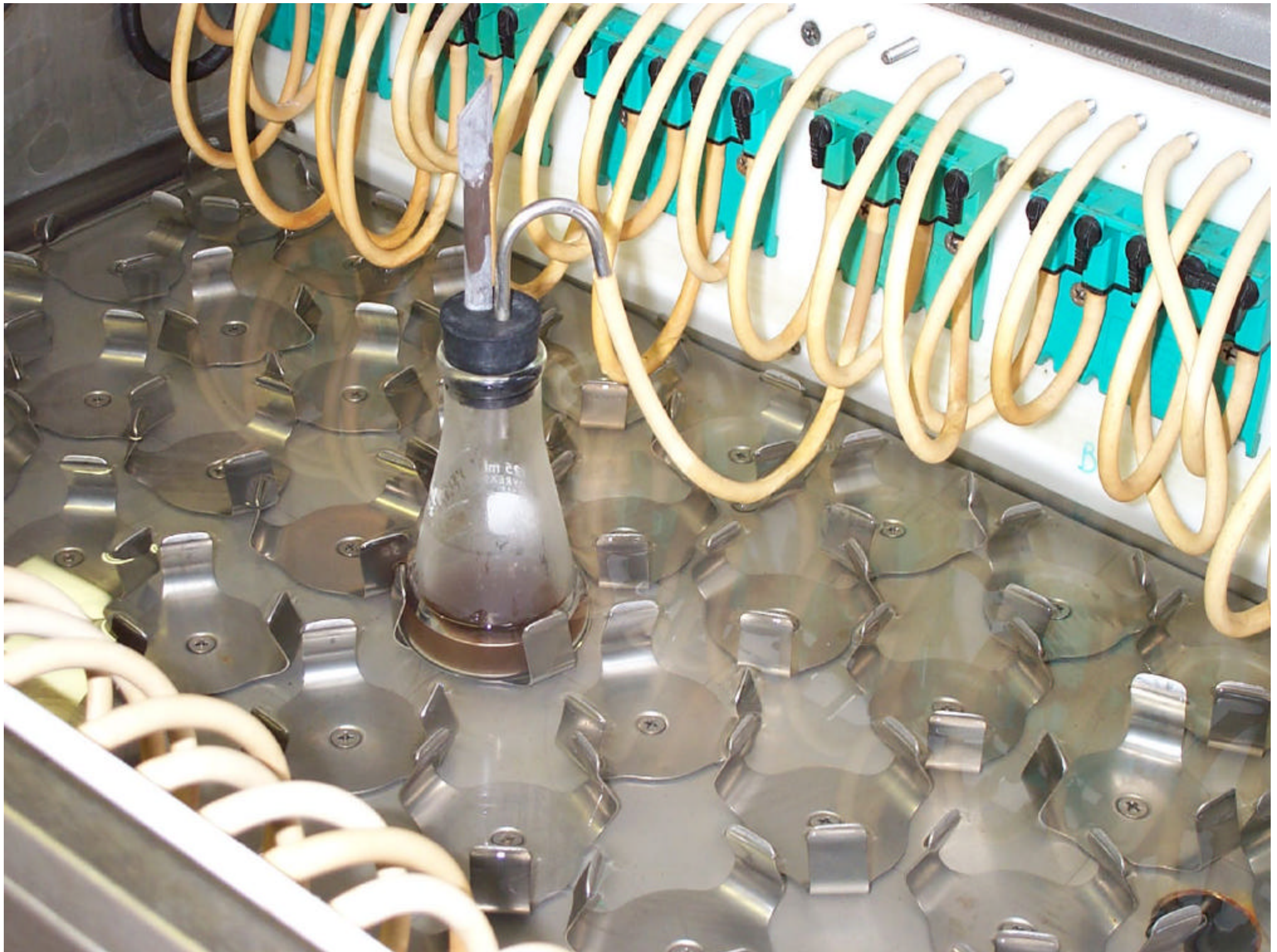
Evaluating forage quality for lactating dairy cows



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Legume/Grass Hays and Silages

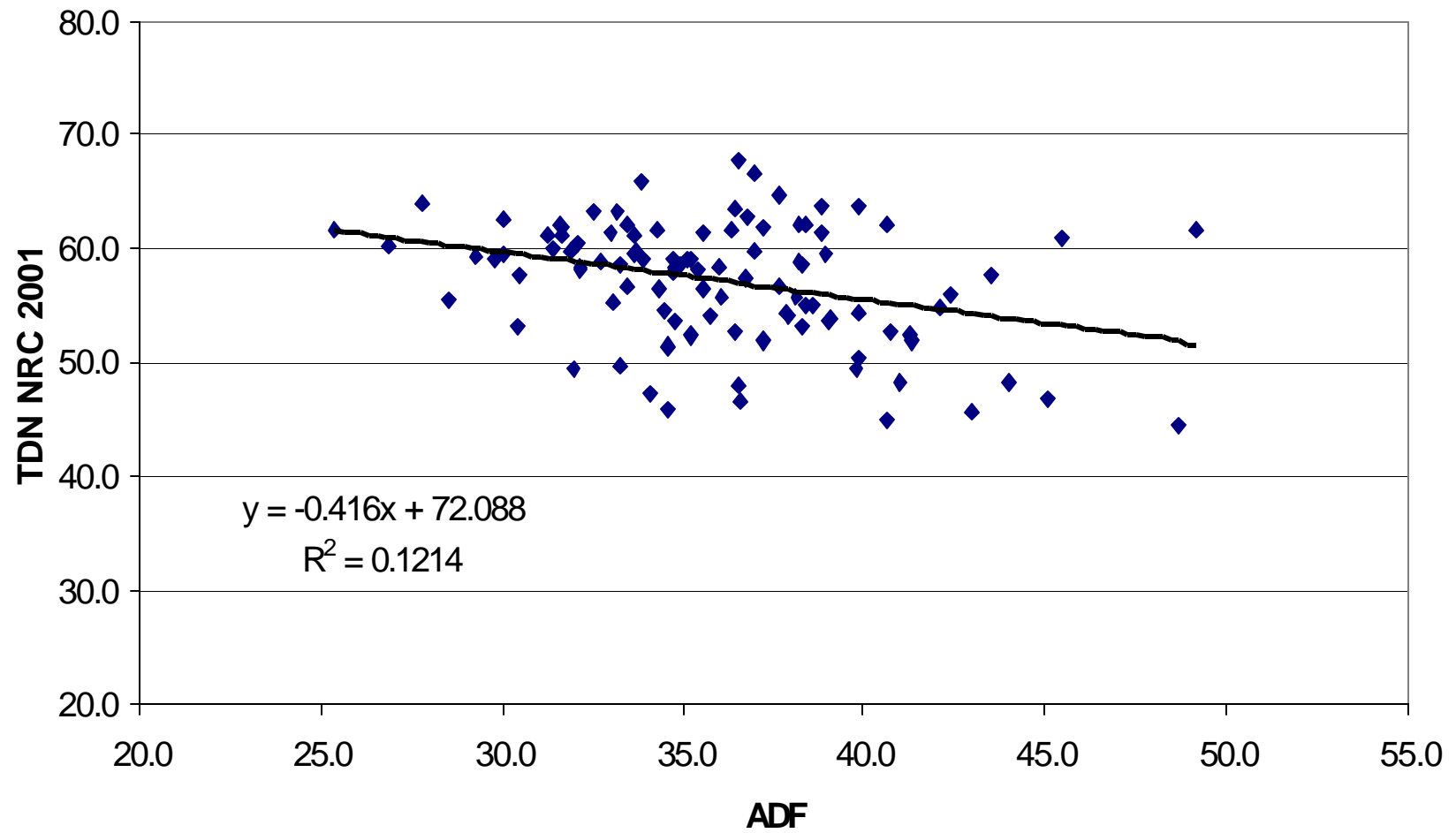




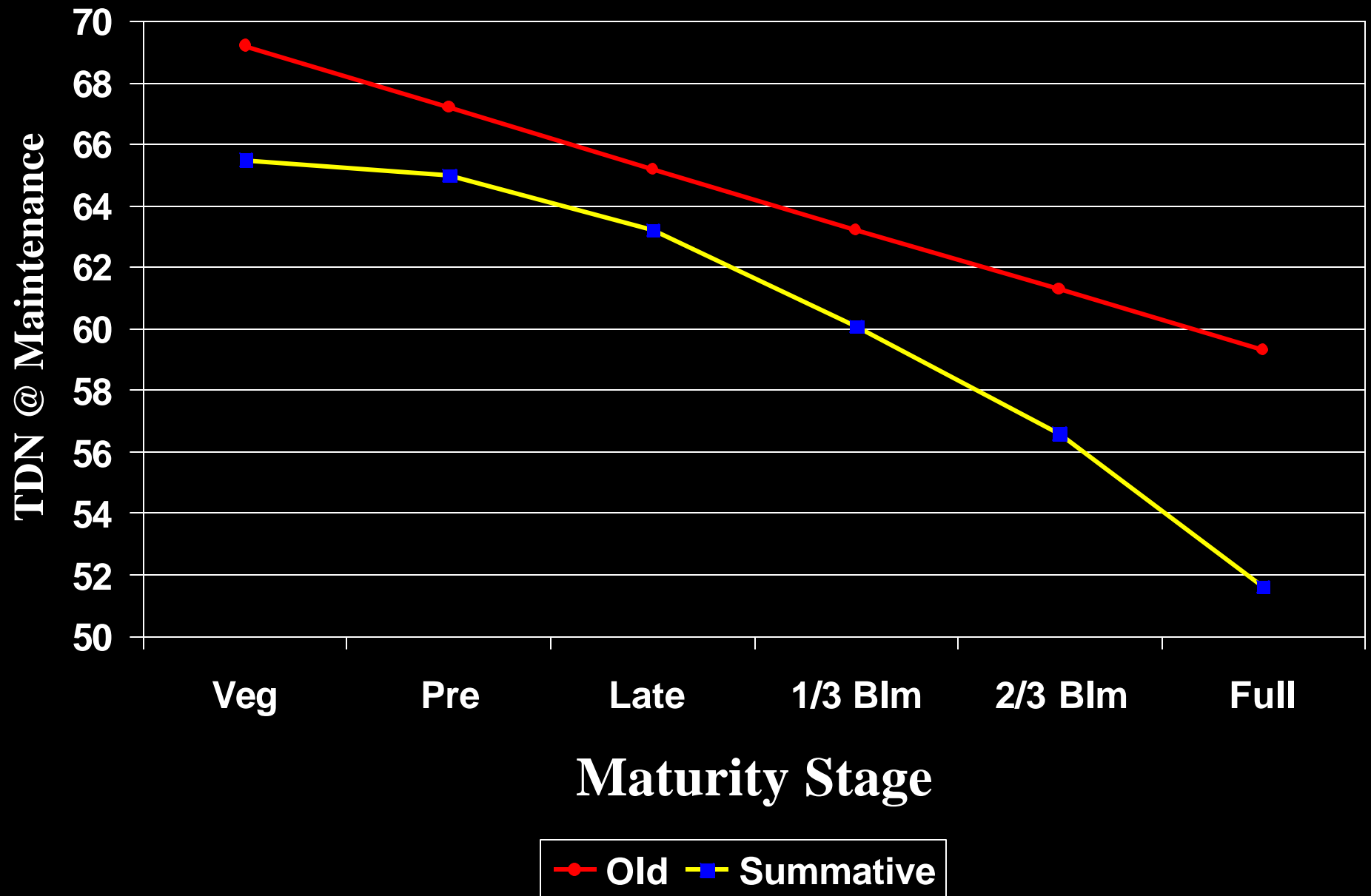
NRC (2001) Dairy TDN of Forages

$$TDN_{1-X} = tdCP + (tdFA \times 2.25) + tdNDF + tdNFC - 7$$

Comparison of ADF to TDN



Maturity Effects on Energy Content of Alfalfa

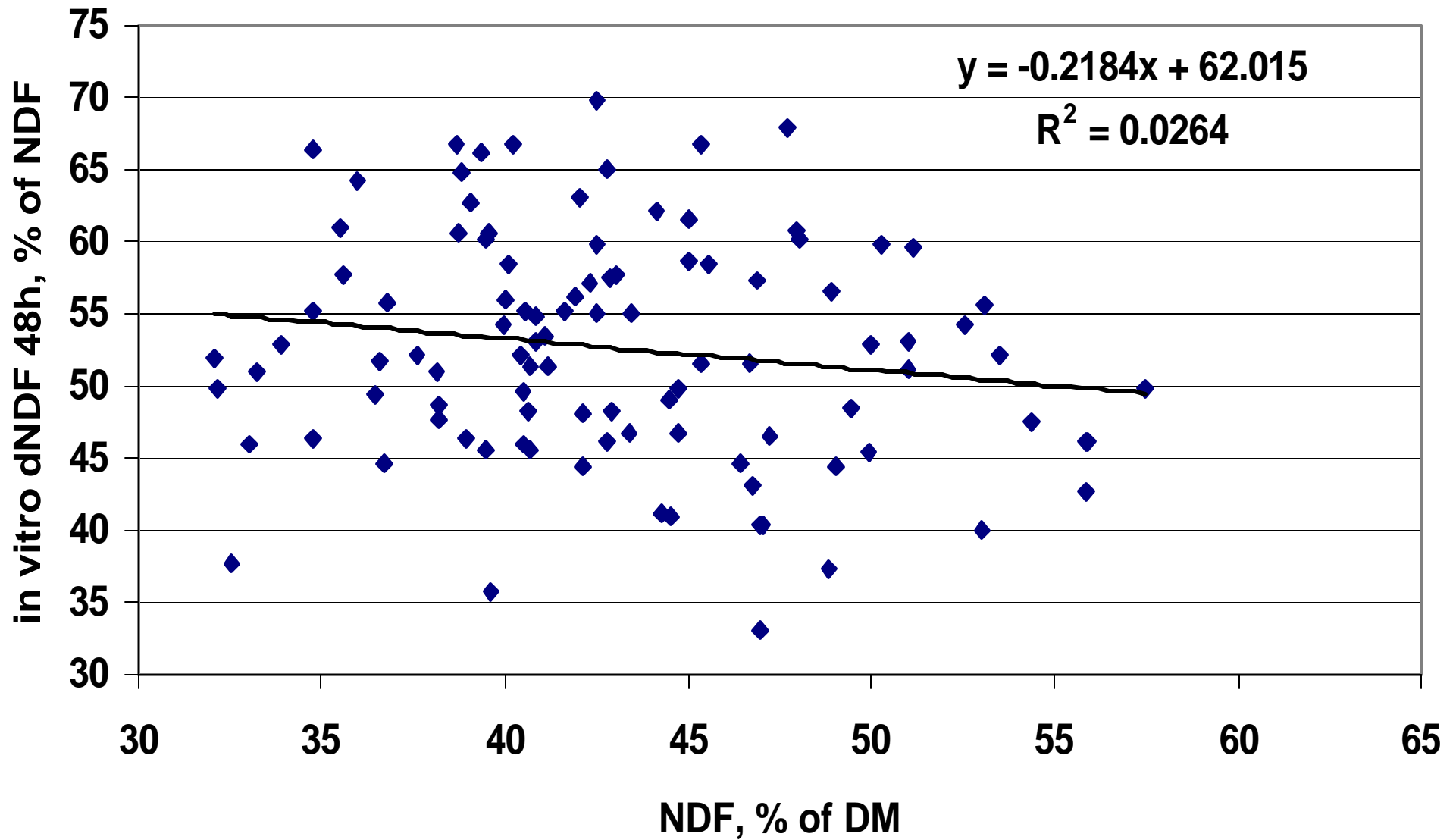


tdNDF

Digestible nutrients from NDF

$$\text{DIG}_{\text{NDF, \% DM}} = (\text{NDF, \% DM} \times 48\text{-h } \textit{in vitro} \text{ NDFD, \%NDF})$$

in vitro NDFD vs NDF



NDF digestibility

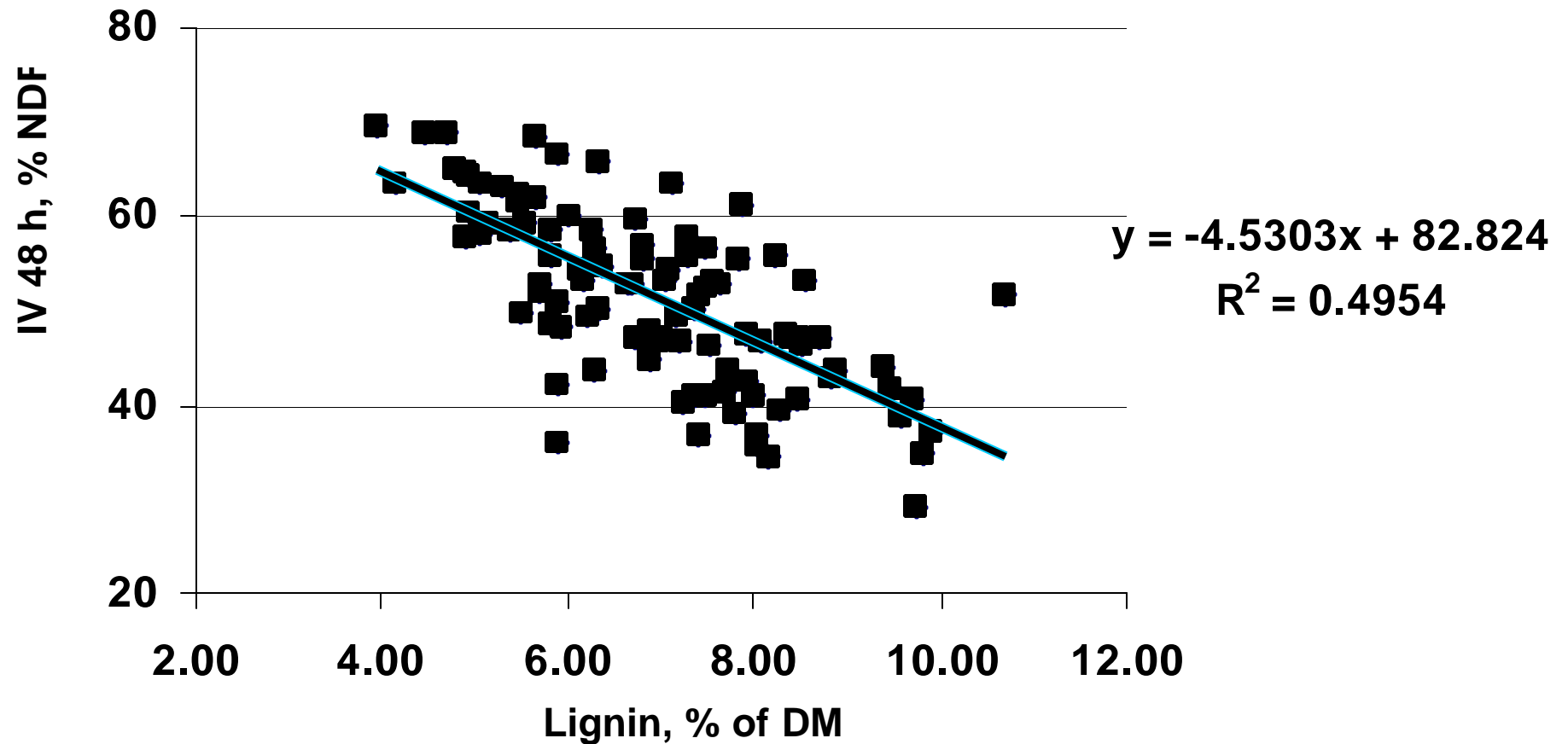
- NRC Dairy 2001:

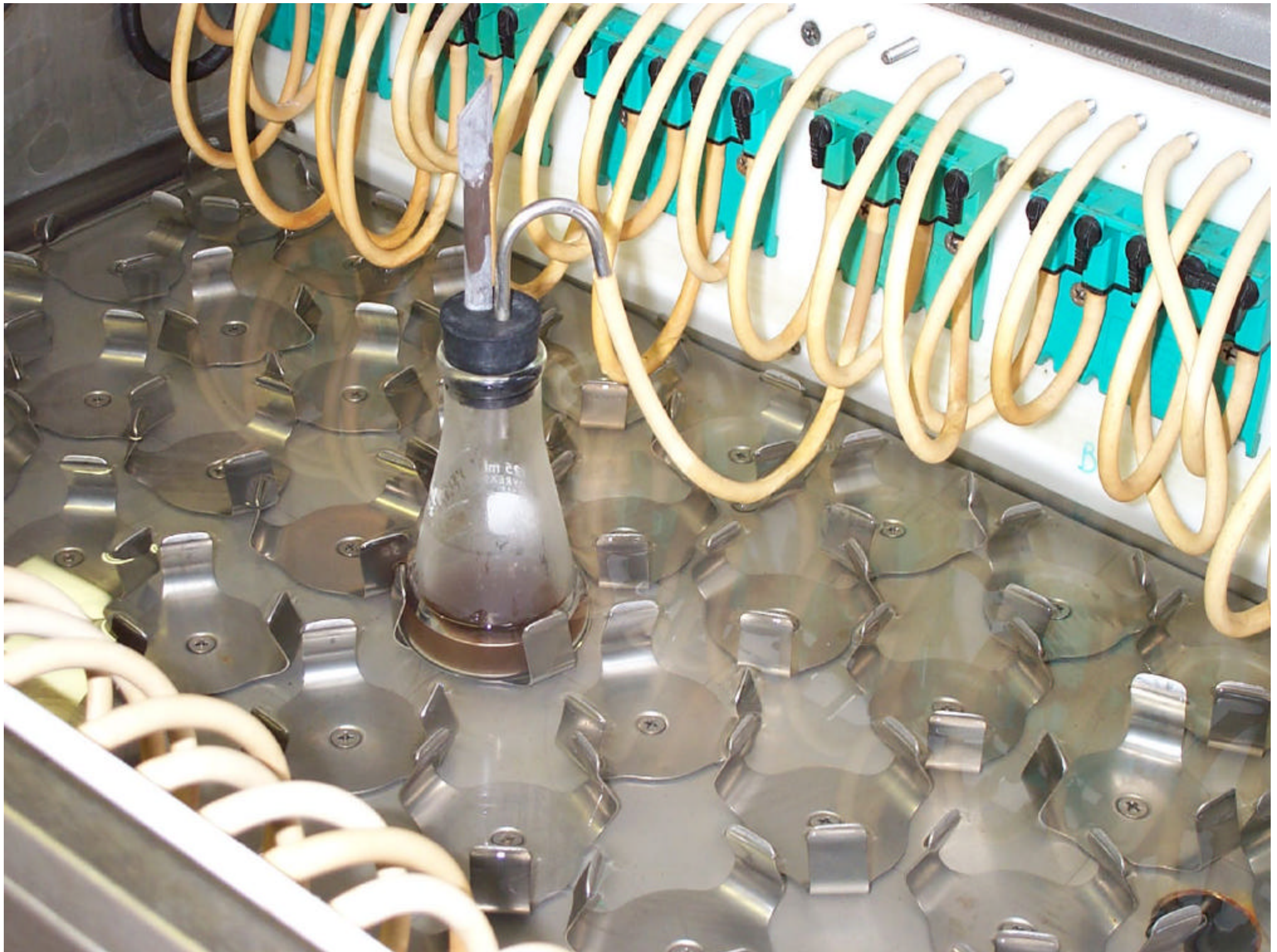
$$.75 \times (\text{NDFn} - \text{Lignin}) \times [1 - (\text{Lignin}/\text{NDFn})^{0.667}]$$

or

48h *in vitro* assay NDF digestibility

IV48h Estimate of NDFD vs Lignin





NDF digestibility of forages

Legume silage/hay



Grass silage/hay



Corn silage



Poor

Fair

Average

Good

Excellent

20 25 30 35 40 45 50 55 60 65 70 75

NDF digestibility, % of NDF

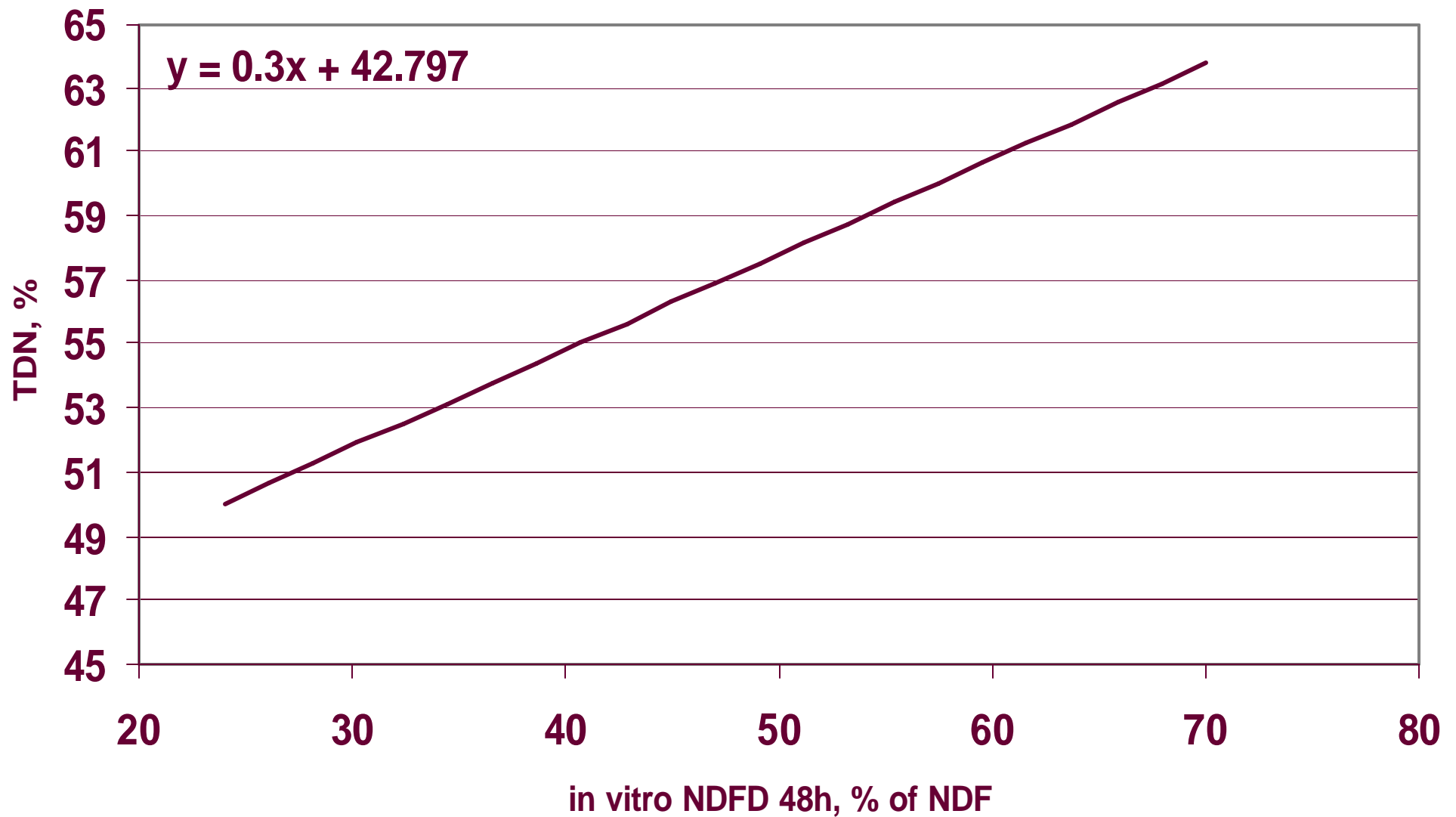
Typical Analysis* of Legume and Grass/Legume Forages

	CP	NDF	NDFD	Milk/ton
	%	%	% of NDF	Lb/tonDM
Average	19	43	53	3000
Range**				
Low Quality	10	60	30	1600
High Quality	30	30	70	3800

*Samples submitted to the UW Soil and Plant Analysis Lab at Marshfield for routine analysis

** Values are extremes for each parameter among all forages tested.

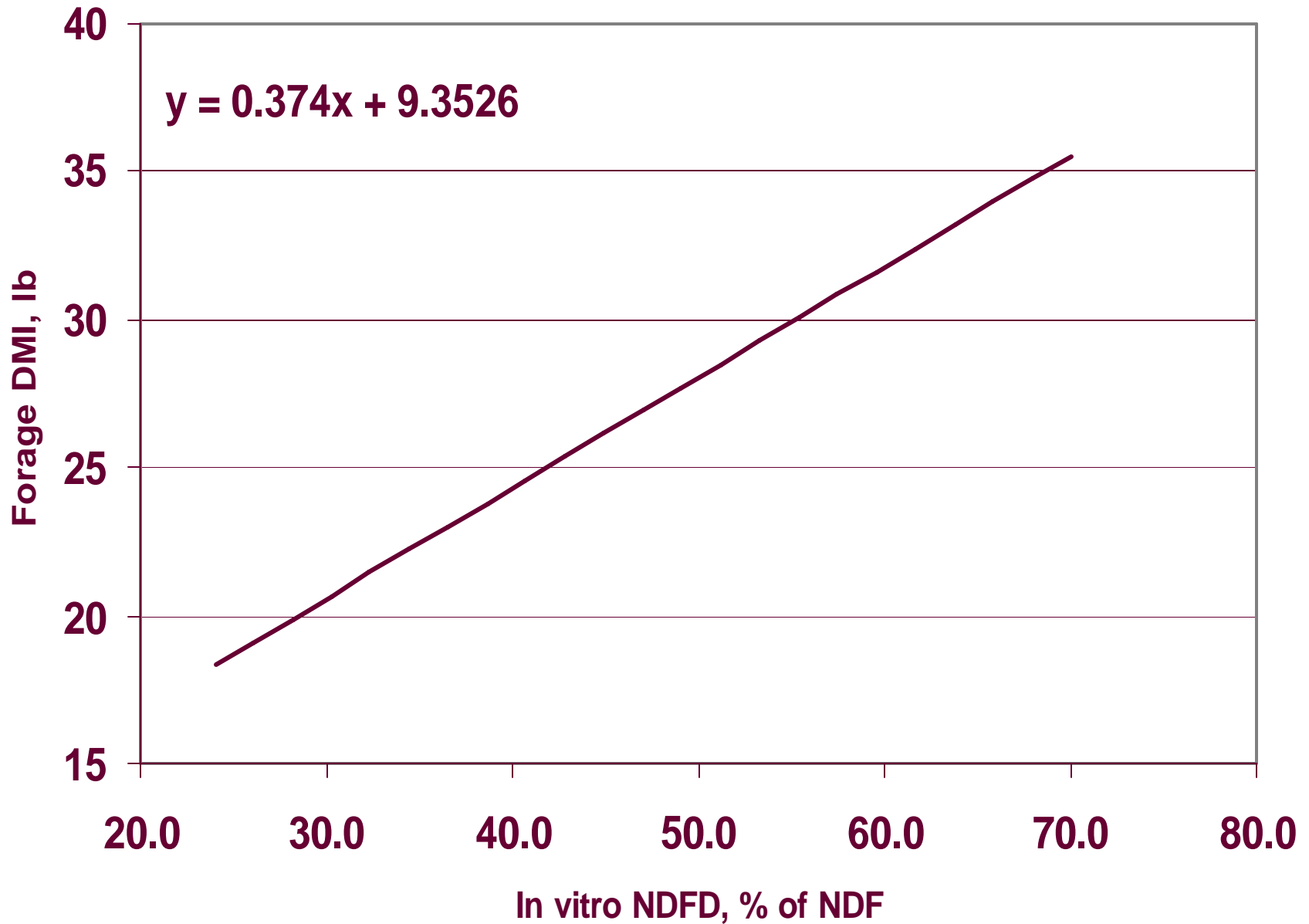
Change in TDN as NDFD changes in a 20-30-40 alfalfa



NDF Digestibility vs. DMI

- Forage NDF intake set at 0.86% of BW
 - NDF intake divided by NDF content to calculate forage DMI
 - Adjusted +/- 0.374 lbs of DMI for each 1% unit change in NDFD above or below average NDFD
-

Change in forage DMI as NDFD changes in 20-30-40 alfalfa

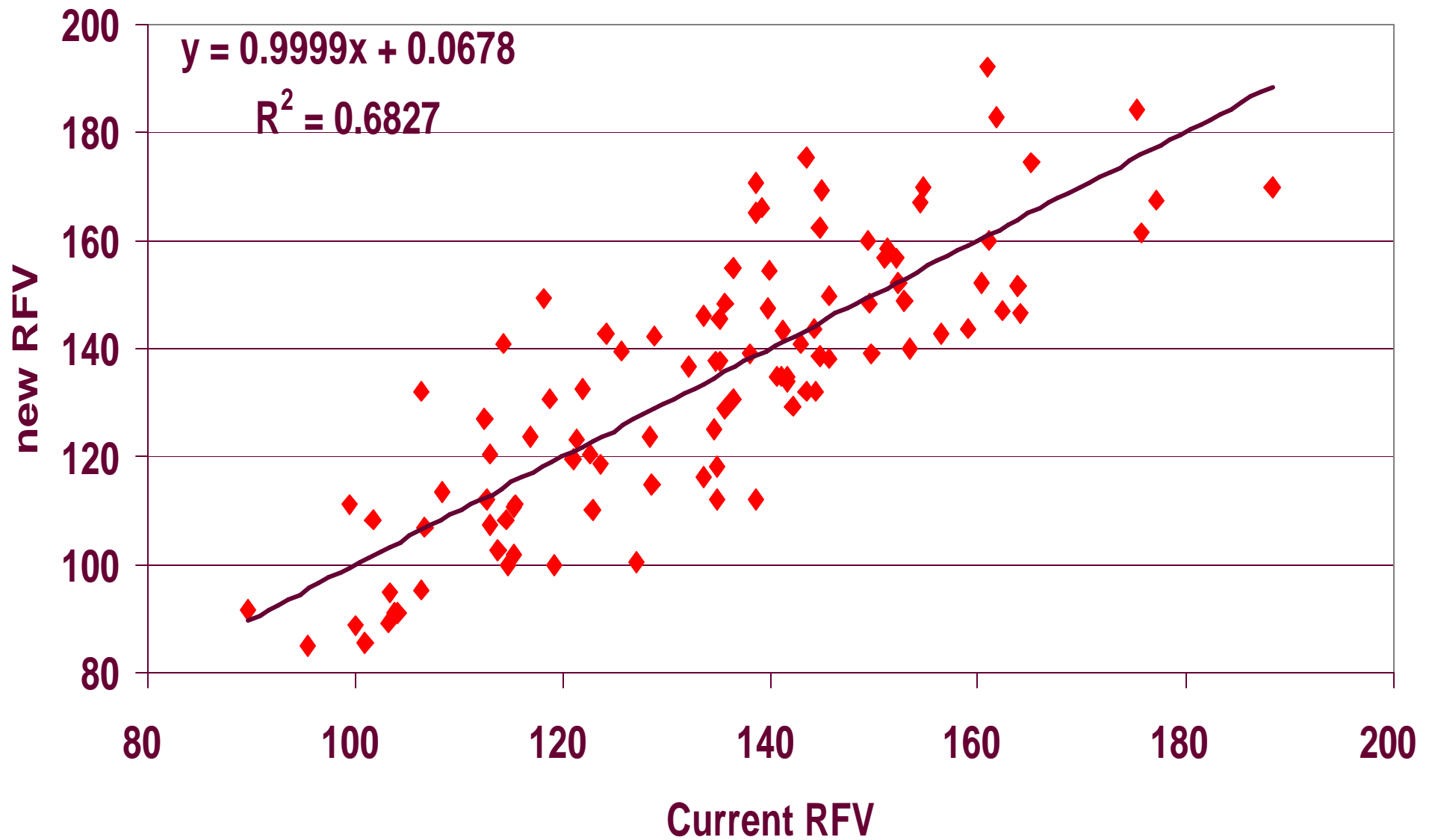


Proposed Change in Relative Feed Value (dRFV)

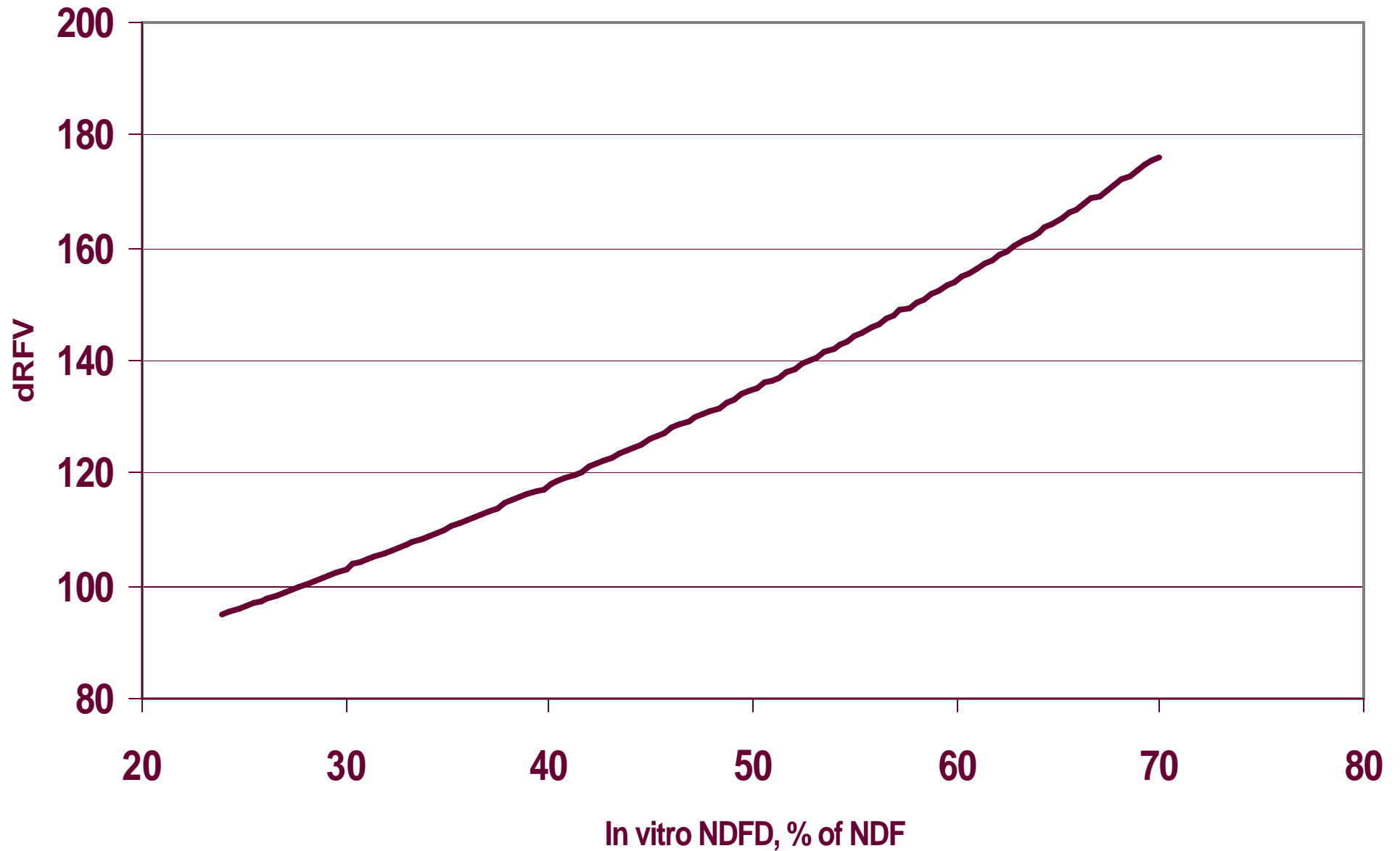
	NDF	ADF	NDFD	dTDN	dIntake
Forage A	40	30	58	61.6	31.0
Forage B	40	30	36	53.6	22.8

	<u>dRFV</u>	<u>old RFV</u>
Forage A	151	152
Forage B	112	152

Comparing Current RFV to dRFV



Change in dRFV as NDFD changes in 20-30-40 alfalfa



NDFD Haycrop Forage - Status

- NIR NDFD & its use in NE_L calculation available from commercial testing labs
 - Marshfield lab performs wet chemistry 48-h NDFD & backs up NIR calibrations for WI labs
 - Dairy One & Cumberland Valley perform wet chemistry 48-h NDFD
 - Use of NDFD in RFV calculation being evaluated
-



NDFD

- Wet Chem vs. NIR
- Wet Chem back-up
- Cost/Turn-Around vs. Accuracy
- Comparison with NRC-01 values
- Standard Hi-Lo NDFD samples
- Within company, herd, year trends

How to use NDFD to adjust rations?

TDN

NDFD can be used directly in the NRC equation to adjust forage TDN

DMI

NRC ration evaluator does not adjust intake due to fiber digestibility

DMI changes .374 lb per unit change in NDFD

Base TMR

Item	Lb DM
Alfalfa 20-30-40-58	25
Corn silage	6
HMC	20
Protein/mineral/vit	7
<hr/>	
DMI	58
<hr/>	
NRC 2001 ration evaluation	
NE allowable milk, lb	93
MP allowable milk, lb	110
NEI balance	- 5.6 Mcal

Suppose alfalfa composition changed to 20-30-40-36:

Impact:

TDN - 61.6 to 53.6

Action steps:

Change alfalfa TDN in ration program via NDFD

Discount TMR intake
 $.374(58-36) = 8 \text{ lb}$

Impact of NDFD

Item	Base TMR 20-30-40-58	Adjusted TMR 20-30-40-36
Alfalfa	25	22
Corn silage	6	5
HMC	20	17
Protein/mineral/vit	7	6
DMI	58	50
NRC 2001 ration evaluation		
NE allowable milk, lb	95	83
MP allowable milk, lb	106	91
NEI balance, Mcal	- 4.7	-8.7

How to make up for forages with low NDF digestibility

Add grain?

Add digestible fiber source?

NDFD - Implications

- **ADF eliminated**
- **Grasses not unfairly penalized**
- **Variance of forage quality is increased**
- **Mature forages have very low energy contents**
- **Better linkage between quality and cow response**

Use of NDF Digestibility Values

- Crop Comparisons
- Hybrid or Variety Comparisons
- Herd Diagnostics
- Energy Prediction
- Determination of Concentrate Type & Feeding Rates
- Determining Forage Prices

Factors Affecting NDF Digestibility

- **Crop**
Legume vs. Grass vs. Corn Silage
- **Cutting**
Spring vs. Summer vs. Fall
- **Stage of Maturity**
- **Climatic Conditions**
Hot vs. Cool, Dry vs. Wet
- **Interactions?**
- **Fermentation type, Heat damage, Spoilage**
- **Others?**

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