

# Forage Quality

It's All About  
Intake  
Digestibility



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# Relative Feed Value (RFV)

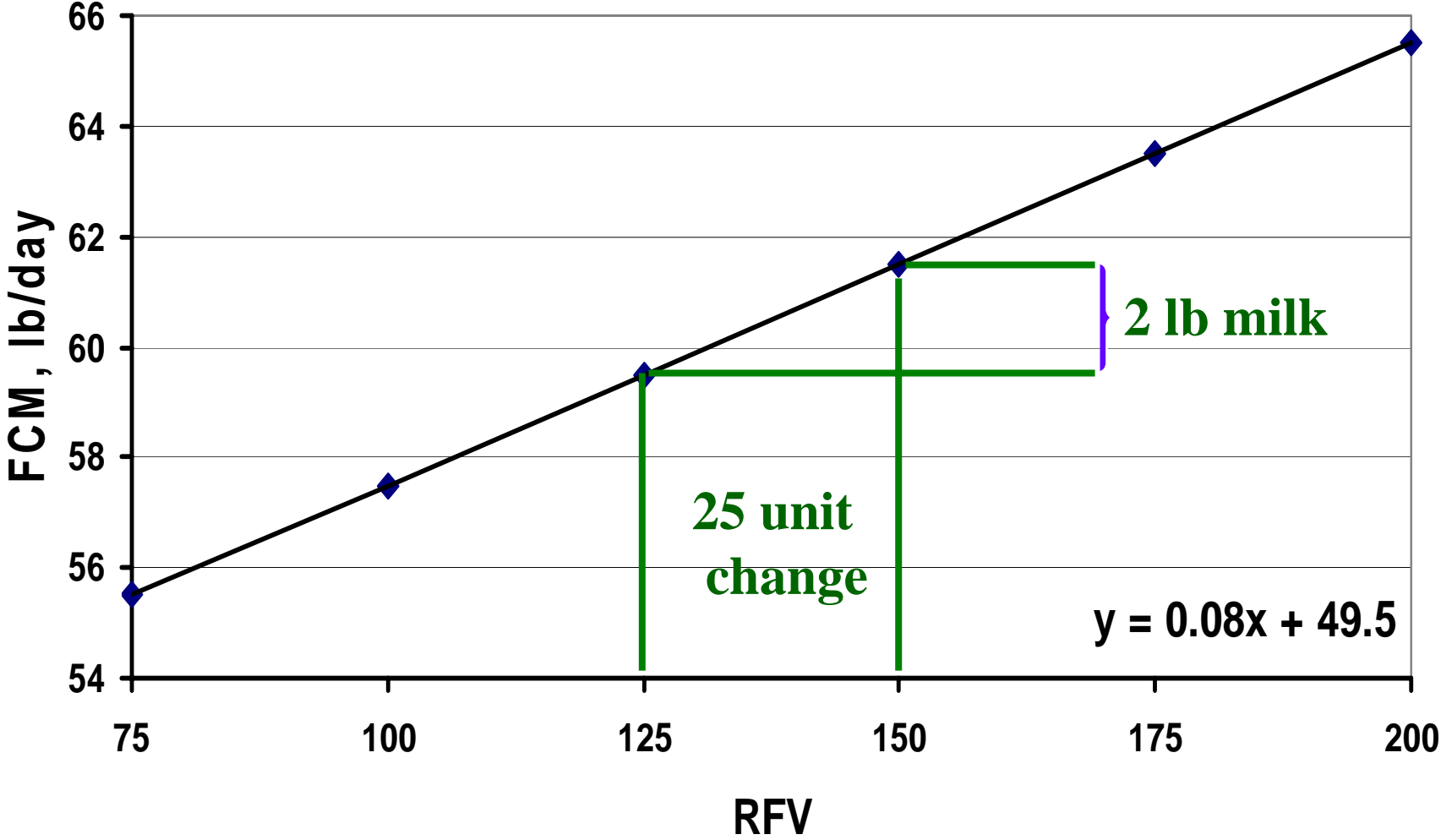


Rank legume and grass forages on potential intake of digestible DM

Price forages

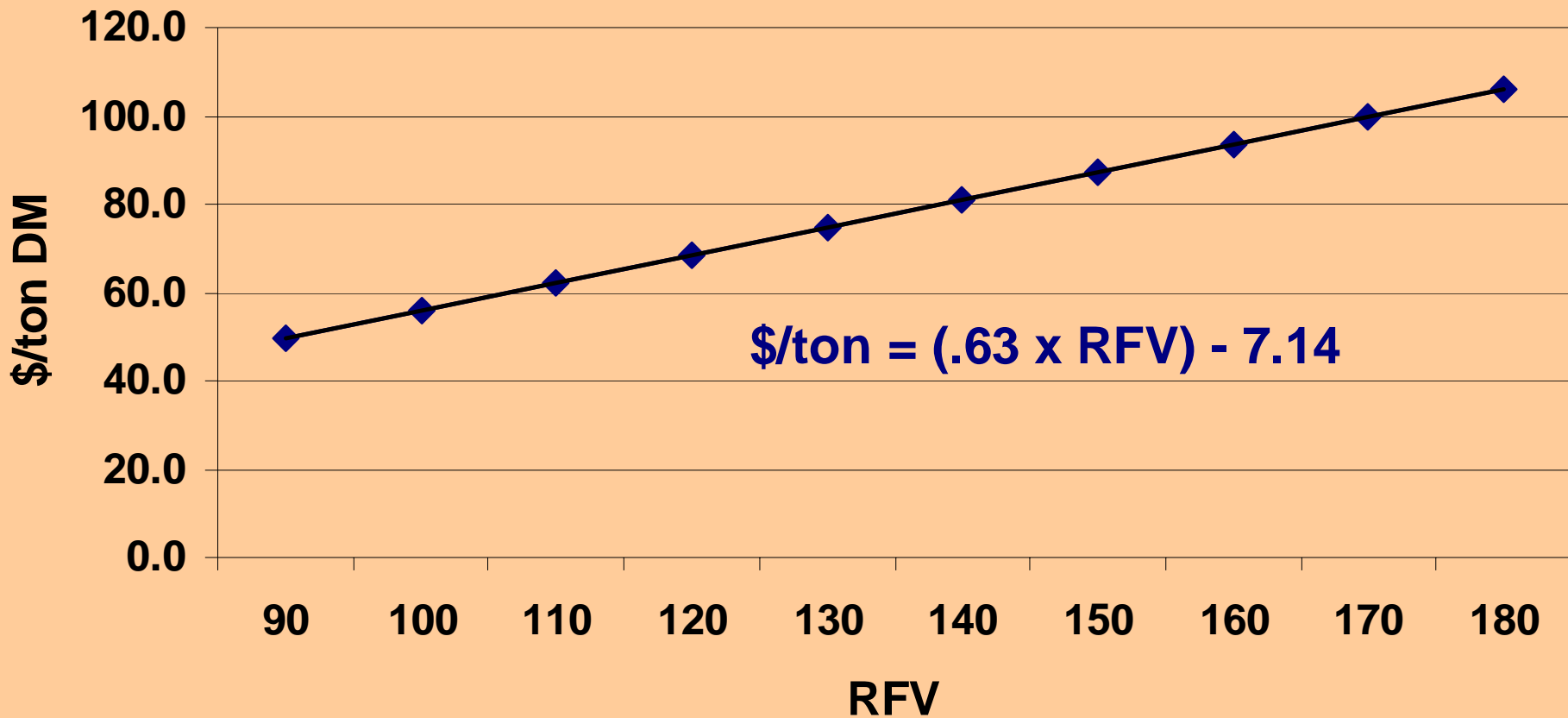


# RFV and Milk Production

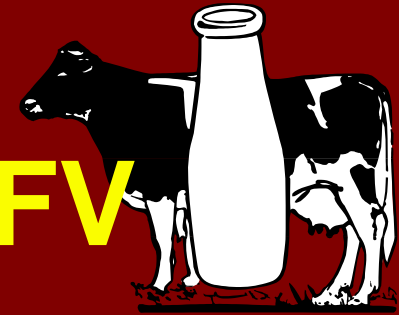


# RFV Pricing Formula

## 1986- 2003 MN



# Limitations of RFV



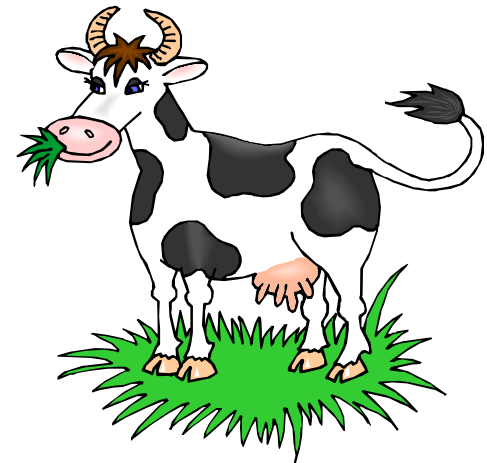
- Single ADF equation to calculate digestibility
- Under valued grasses because of NDF intake bias
- Very limited validation with cow studies



# Relative Forage Quality

**"RFQ"**

- $RFQ = \frac{(DMI, \% \text{ of BW}) \times (TDN, \% \text{ of DM})}{1.23}$
- **TDN** – summative equation - Dairy NRC – 2001
- $TDN\ 1-X = tdCP + (tdFat \times 2.25) + tdNDF + tdNFC - 7$
- $td = \text{truly digestible}$



# A New Frontier in Defining Forage Quality Fiber (NDF) Digestibility



# *Fiber Partition of Various Forages*

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<b>Forage</b>	<b>NDF % DM</b>	<b>Hemicellulose -----% of NDF-----</b>	<b>Cellulose</b>	<b>Lignin</b>
<b>Legumes</b>	<b>40 - 50</b>	<b>22</b>	<b>64</b>	<b>15</b>
<b>Grasses</b>	<b>45 -</b>	<b>32</b>	<b>57</b>	<b>11</b>
<b>Corn sil</b>	<b>60 40 - 50</b>	<b>42</b>	<b>51</b>	<b>6</b>

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# So, How Important is Forage NDF Digestibility?



# Impact of Fiber Digestion on Milk Production

- Fiber digestibility can improve animal performance when forage is the sole dietary ingredient.
- Dairy cows are fed complex mixed diets
  - ❖ where forages represent only 40 to 60% of the diet
  - ❖ Forage fiber accounts for only 20 – 25% of the DM fed



# Impact of Fiber Digestion on Milk Production

- Therefore, detecting the impact of increased fiber digestibility on milk production is difficult.
- An important question is:
- *How large must the increase in fiber digestibility be in order to get an increase in milk production with typical lactation diets?*



# Value of Forage NDF Digestibility



- 1 % unit increase in Dig NDF
- (Oba and Allen – 1999)
- = .37 lb DMI
- = .55 lb milk

Increase NDF digestibility from 50 to 55%  
= 1.87 lb more DMI  
= 2.75 lb more milk



# Impact of Fiber Digestion on Milk Production

Dado and Allen (1996)

- **Two alfalfa haylages**
  - ❖ 3% unit difference in NDF digestibility
- **Higher digestibility haylage**
  - ❖ 4.4 lb milk more milk/day
  - ❖ Cows ate 2.2 lb more DM/day
  - ❖ High digestibility haylage lower in NDF (1.8%)



# Impact of Fiber Digestion on Milk Production

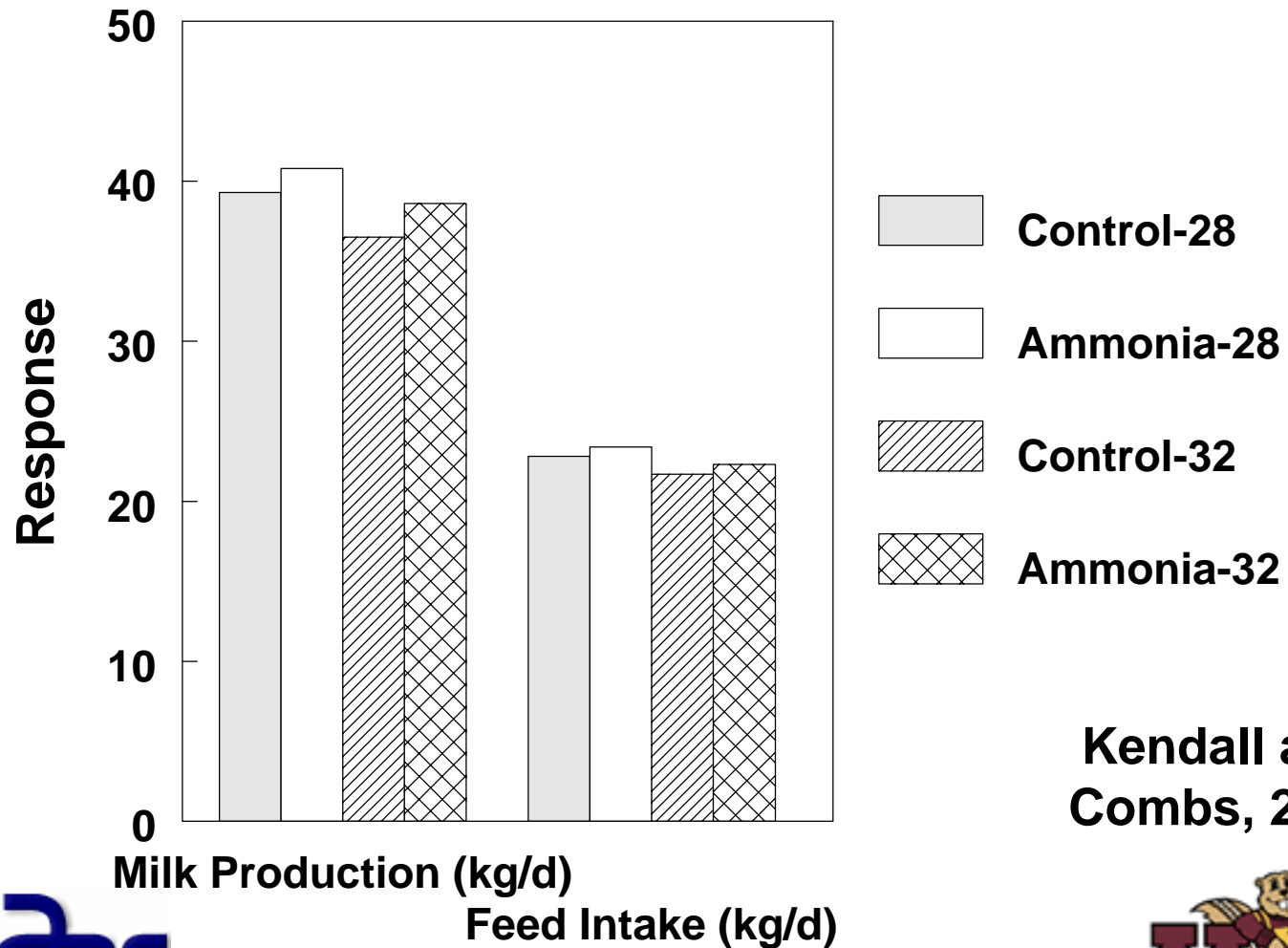
- **Wheat straw NDF digestibility**
  - ❖ Straw – 41%
  - ❖ Ammoniated wheat straw – 62%
- **Wheat straws in diets**
  - ❖ 8.5% of the diet DM = 28% NDF diets
  - ❖ 16% of diet DM = 32% NDF diets.



Kendall and Combs (2004)

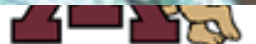
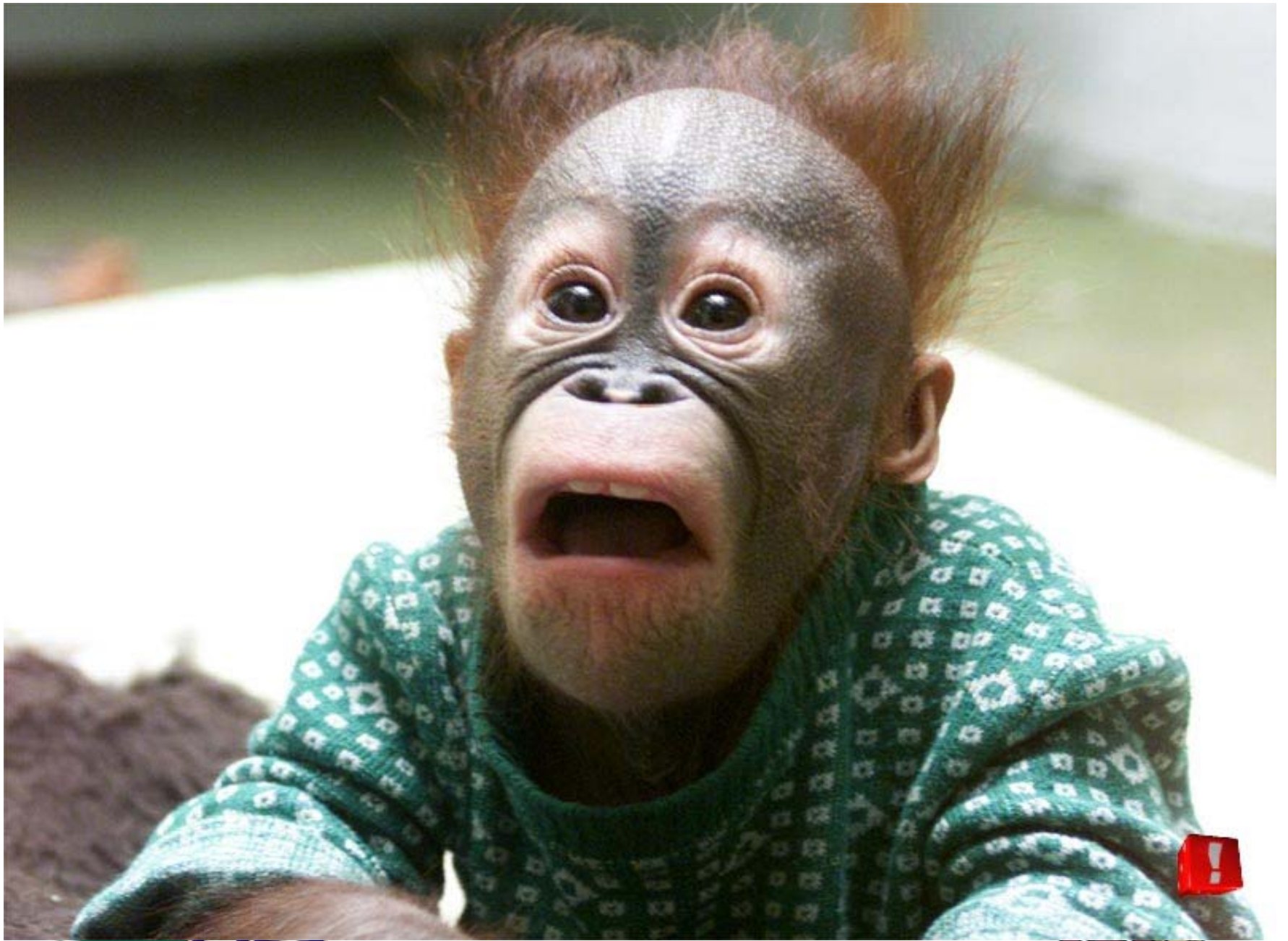


# Impact of Ammoniated Wheat Straw in 28 and 32% NDF Diets on Cow Performance



Kendall and  
Combs, 2004







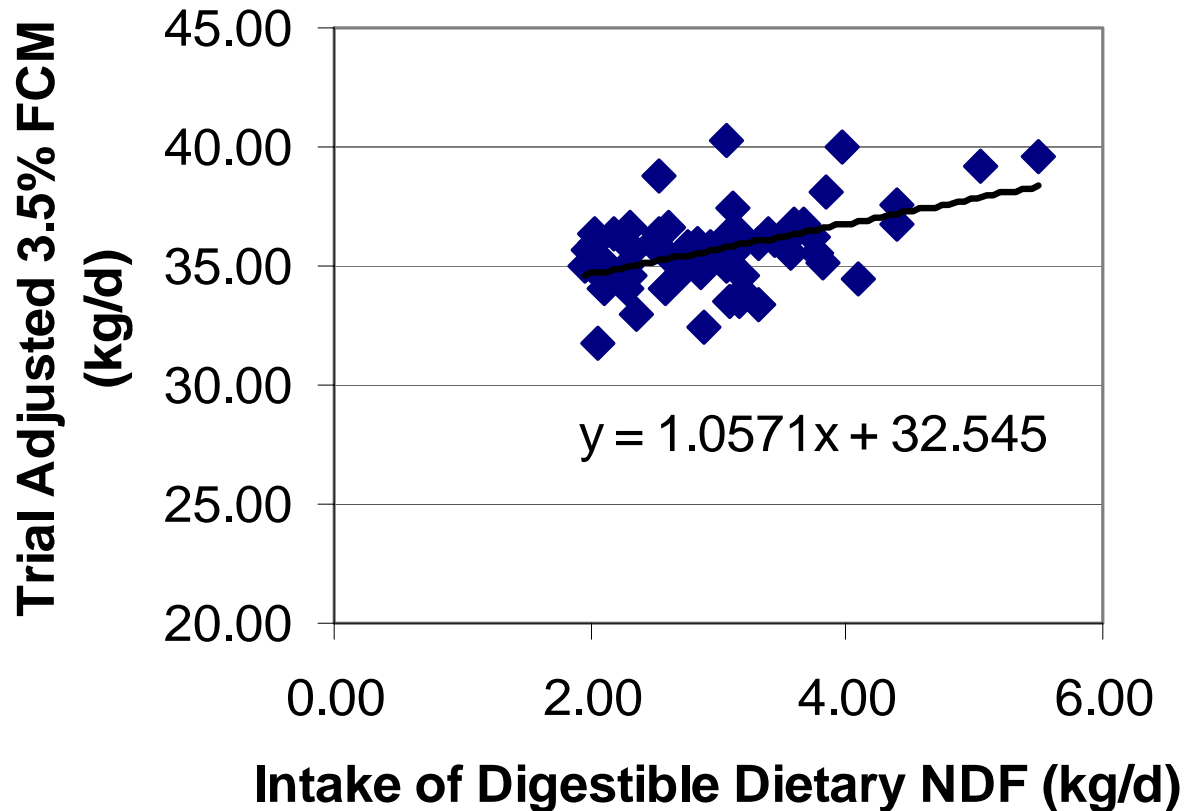
# Impact of Fiber Digestion on Milk Production

Hans Jung, Mary Raeth-Knight and Jim Linn

- Meta analysis using 19 studies reported in the Journal of Dairy Science from 1999 to 2004 with 63 observations was conducted.
- NDF digestibility was positively related to 3.5% FCM and DM intake across the studies.
- Diet NDF and forage percentages were not related to milk production or feed intake.



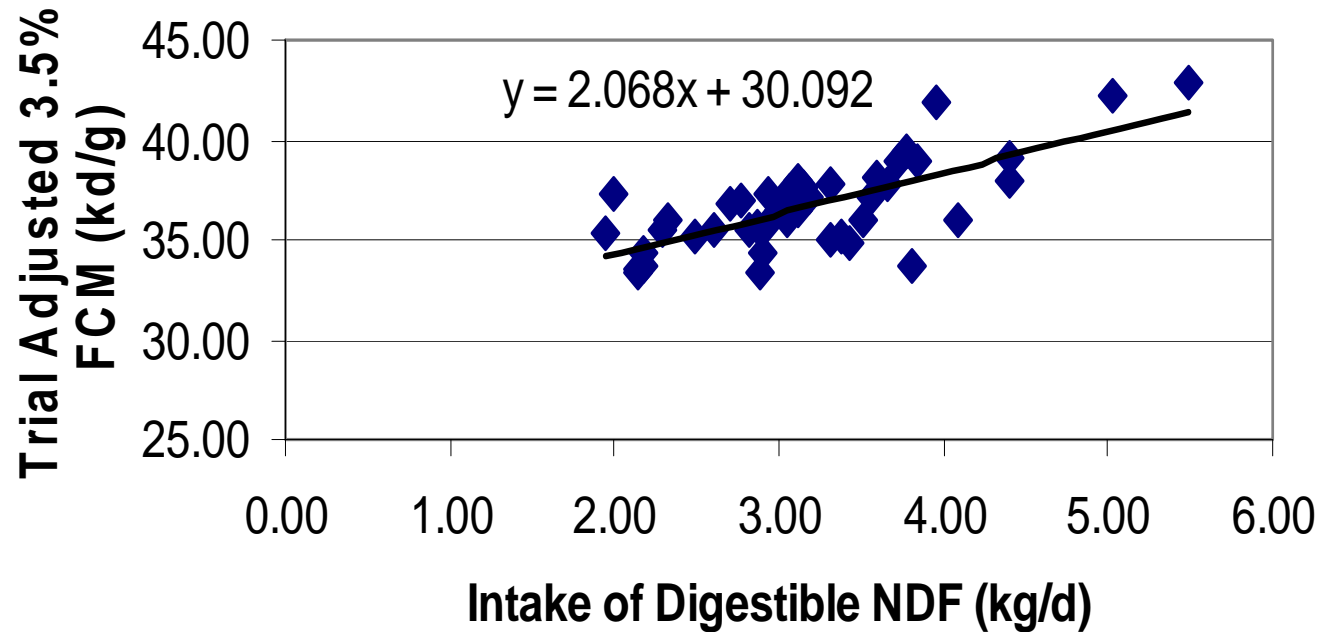
# Effect of Increasing Digestible NDF Intake on Milk Production



63 treatment means – 19 studies from J. Dairy Sci. 1999-2004



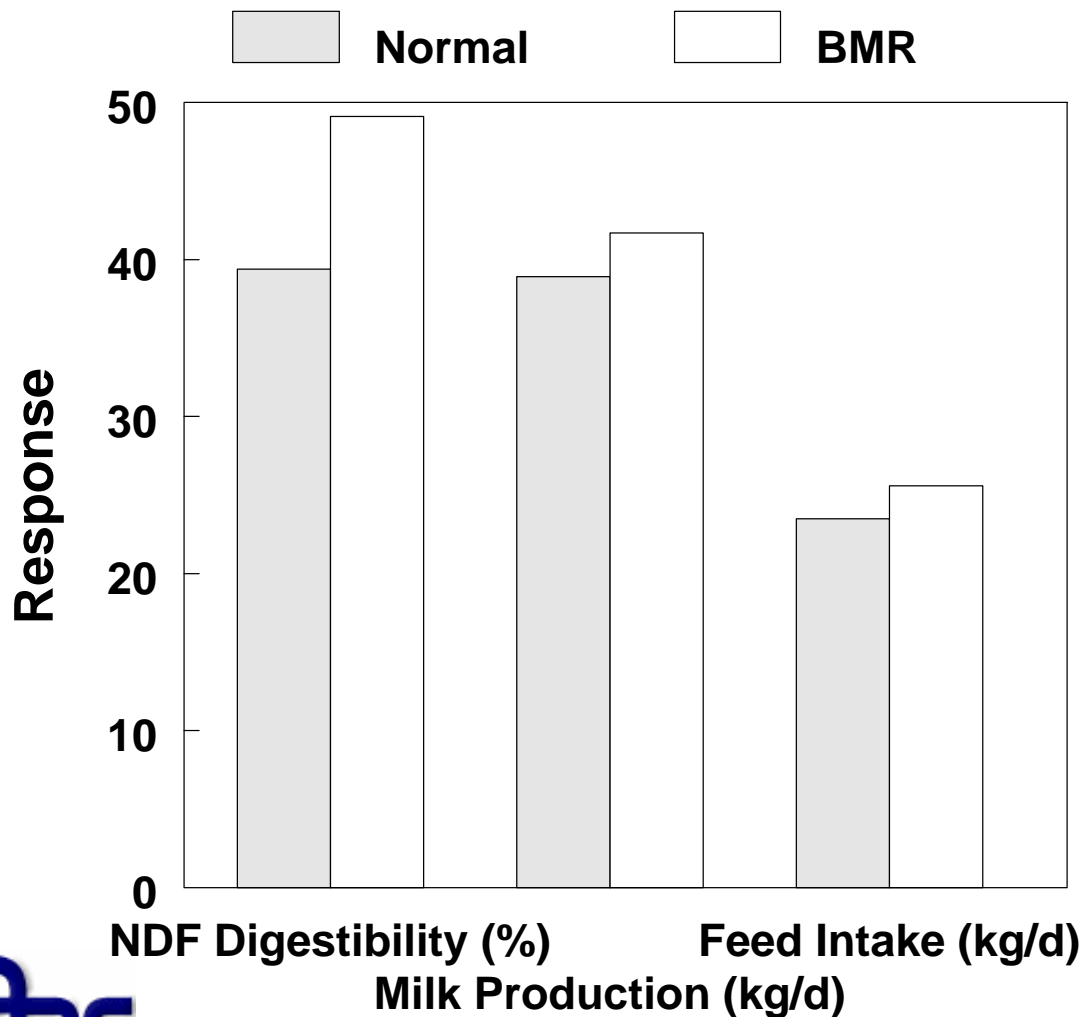
## Observations with Diets > 50% forage



# Corn Silage Quality



# Impact of Brown Midrib Corn Silage on Cow Performance



Oba and  
Allen,  
1999



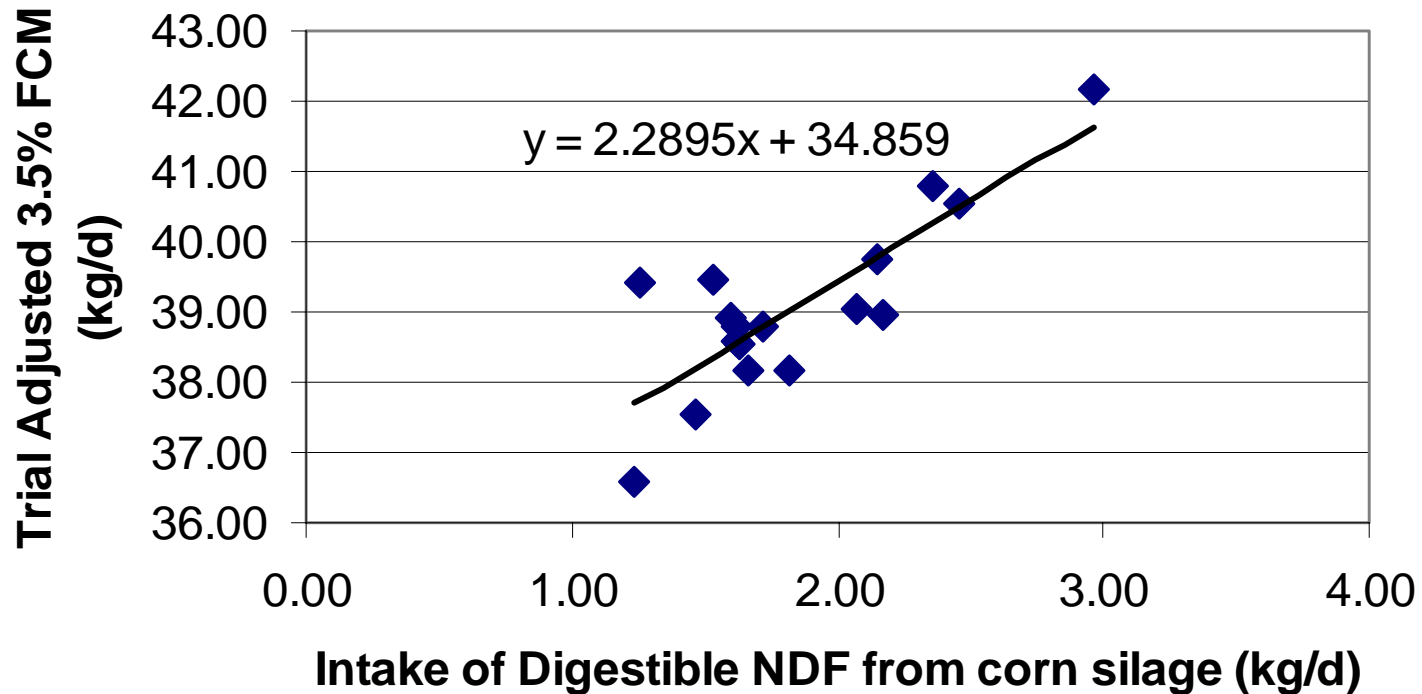
# Impact of Fiber Digestion on Milk Production

Hans Jung, Mary Raeth-Knight and Jim Linn

- Meta analysis using 19 studies reported in the Journal of Dairy Science from 1999 to 2004 with 63 observations was conducted.
- High corn silage diets > 40% of the DM
- 17 observations from 7 studies



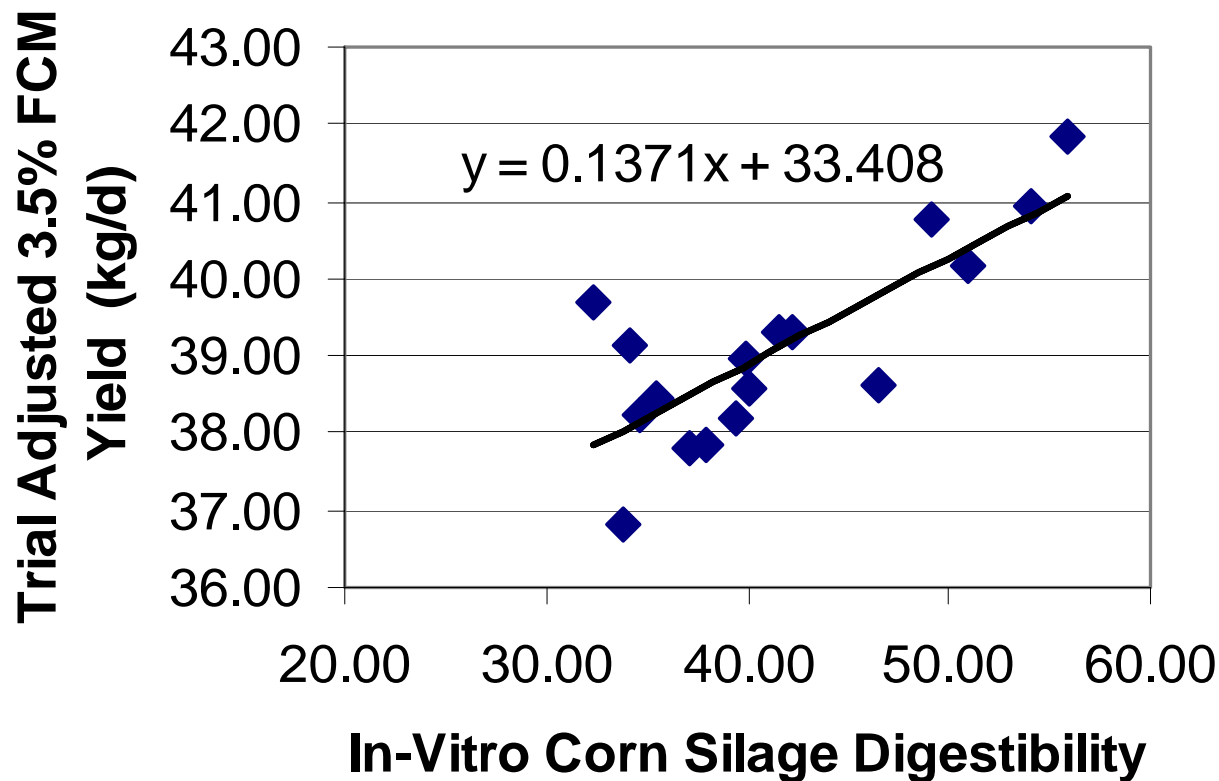
# NDF Digestibility Effect Corn Silage > 40% of diet DM



17 observations from 7 studies, JDS 1999 - 2004



# Relationship of Milk Production with Corn Silage NDF Digestibility



17 observations from 7 studies, JDS 1999 - 2004





# Impact of Corn Silage Fiber Digestion on Milk Production

- Based on data analysis: high corn silage diets
- 1% increase in *in vitro* NDF digestibility of corn silage =
  - ❖ 0.14 kg/d increase in 3.5% FCM
  - ❖ 0.12 kg/d increase in DM intake



**THANK YOU**

