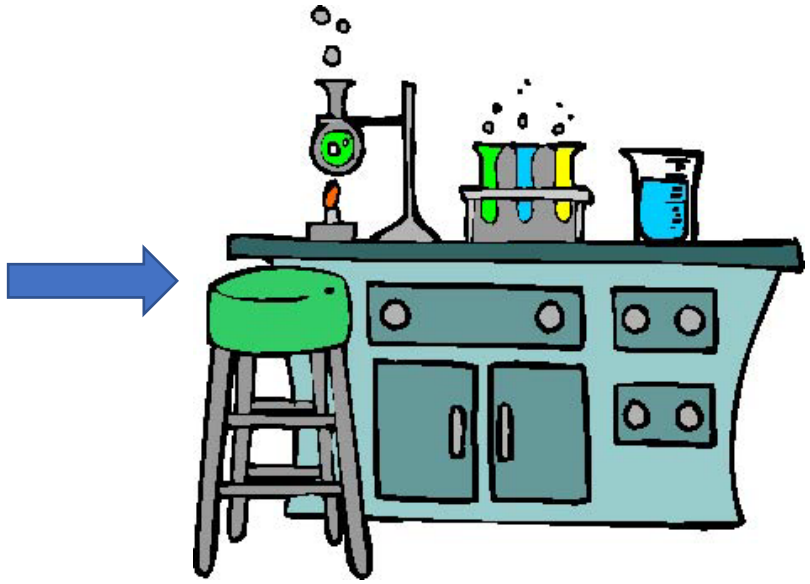
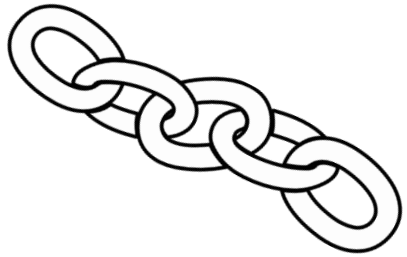
Linking Forage Quality with Economic Value





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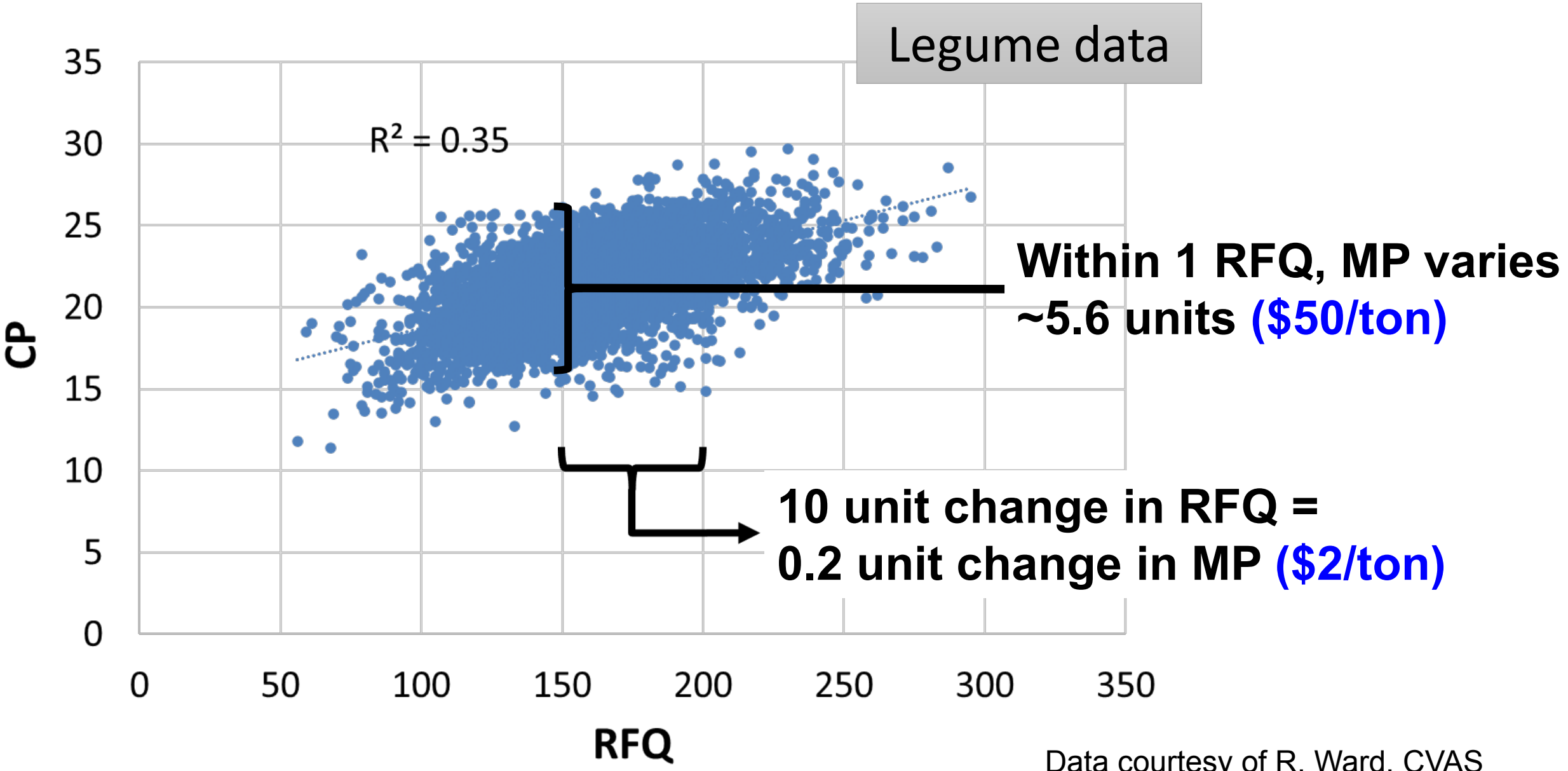
Currently, RFQ and RFV are used to value forages

RFQ = (DMI * TDN)/1.23

- Proxy for energy intake
- As [NDF] increases, RFQ decreases
- Does not implicitly value protein
- Current approach to diet formulation has reduced the relevance of these indices

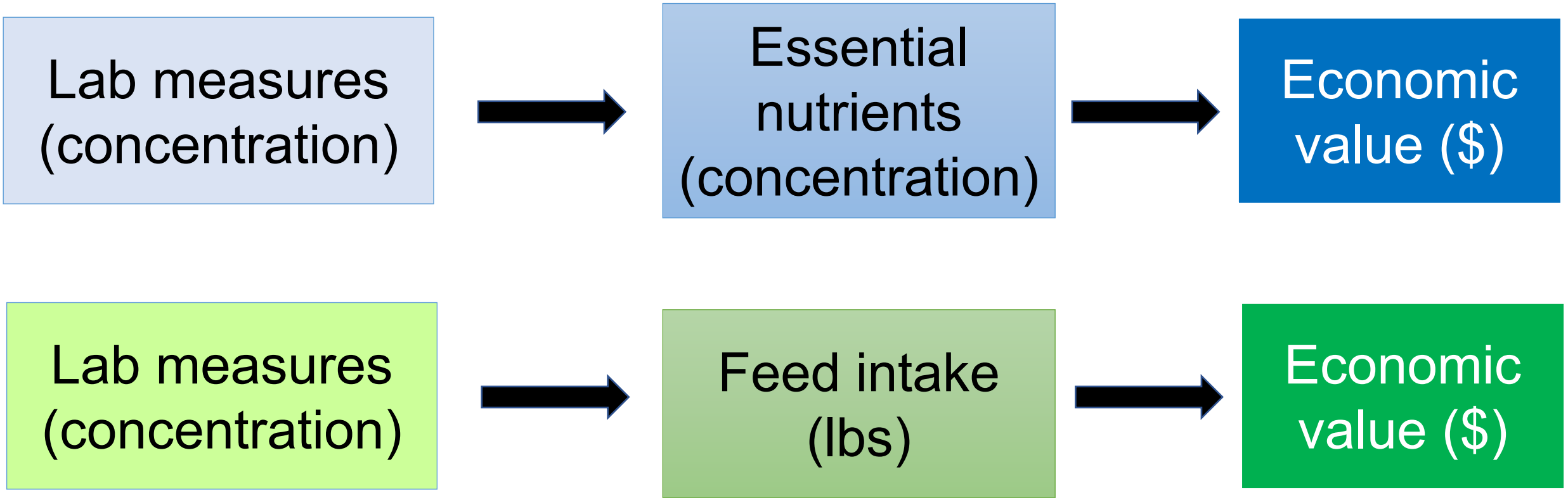
RFQ gives protein little additional value



Data courtesy of R. Ward, CVAS

Forages get value by producing milk and meat

- Cows need nutrients to produce milk
- Cows need to eat lots of nutrient to produce lots of milk



Lab measure	Quality Factor
NDF	Forage NDF (essential nutrient) DMI (negative)
CP	Metabolizable protein (essential nutrient) **For forage MP = CP*0.56**
NEL	NEL (essential nutrient)
IVNDFD	DMI

Converting lab data to $

- Various mathematical/statistical methods can do this
- Method based on least squares approach is most robust
- SESAME software uses that approach
- **Regional** results are available from different sources (*Buckeye Dairy News; Progressive Dairyman*, etc.)

Nutrient	West Region	Midwest
NEL, $/Mcal	0.132	0.115
MP, $/lb	0.519	0.538
fNDF, $/lb	0.312	0.125

September, 2022 prices were used

Nutrient $ Value Example (Sept, 22 Midwest region)

	Conc.*	Amt/ton	$/unit	$/ton
Dry matter	88%	1760 lbs	. . .	
CP	23%	405 lbs	. . .	
MP	12.9%	227 lbs	0.54	122
NEL	0.69 Mcal/lb	1214 Mcal	0.12	145
fNDF	39%	686 lbs	0.12	82
IVNDFD	55% of NDF	NA	. . .	
Total				**349**

* DM basis

Interpretation

- Compared with other feeds, this alfalfa is worth $349/ton

This approach is great for:

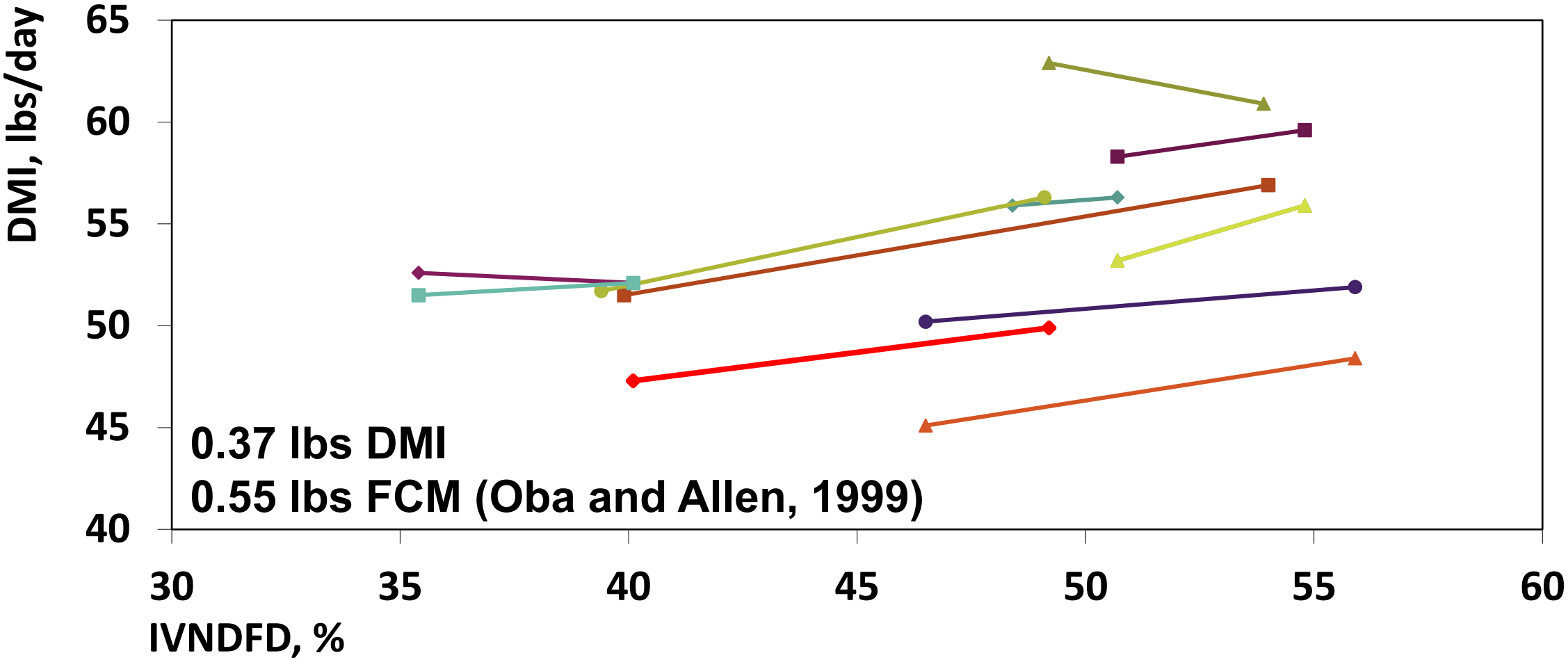
- Corn grain vs. wheat
- DDG vs corn gluten
- Soybean meal vs cottonseed meal

- Compared with other feeds, this alfalfa is worth $349/ton
  If it does not affect on intake or milk production

Nutrient composition of forages does NOT account for all economic value

Change in IVNDFD can be used to adjust for quality

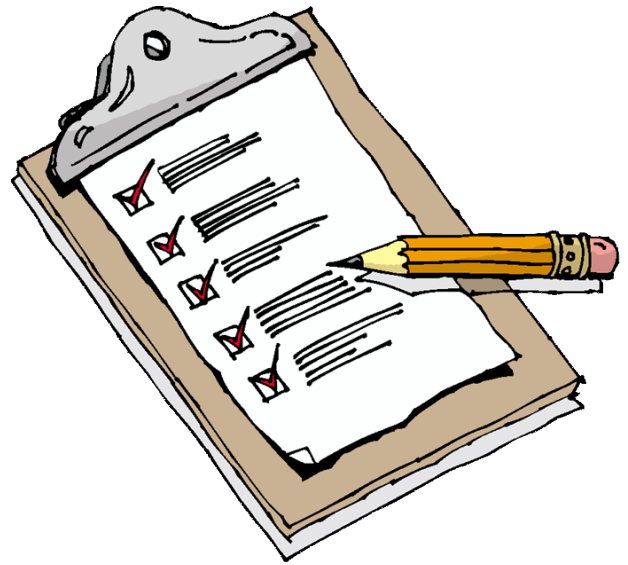
With 12 new comparisons (Oba and Allen, 2005)
Avg: **0.26 lbs DMI**/IVNDFD unit = **0.5 lbs FCM**



Adjusting Nutrient Value for Quality

What is standard?

1. Measure 30 or 48 h IVNDFD
2. Calculate change from standard (Sample – **Std**)
3. Multiple difference by 0.5 lbs of milk
   Multiple difference by 0.26 lbs of intake
4. Convert to income over feed costs
5. Convert to ton basis



Change requires a reference or standard value

1. “Universal” **48 h** IVNDFD means (NASEM 2021)

Alfalfa	49
Corn silage	52
Cool season grass	64

2. Specific lab mean
   Must use same lab for sample

3. Something else ?

Example: Quality Adjustment

Alfalfa hay: 0.69 NEL, 13% MP, 39% NDF; **Nutrient value = $349/T**

48 h IVNDFD = 55% (NASEM mean =49)

1. **Difference in IVNDFD:** **55** – 49 = **6** units
2. **Expected increase in milk:** **6** x 0.5 = 3.0 lbs
3. **Expected increase in DMI:** **6** x 0.26 = 1.6
4. **Increase IOFC:** $0.44/day (Milk = $20/cwt, feed = $10/cwt)
5. **At 22 lbs DM inclusion:** 0.44/22 x 1,760 lbs DM/T = $35
6. **Final value:** 349 + 35 = **$384/ton as-fed**

Quality adjustment per IVNDFD/ton of DM

	Milk price			
Feed	**$14/cwt**	**$17/cwt**	**$20/cwt**	**$23/cwt**
$8/cwt	4.5	5.8	7.2	8.6
$10/cwt	4.0	5.4	6.7	8.1
$12/cwt	3.5	4.9	6.3	7.6

Example: Test forage is 5% units lower in IVNDFD than standard: -5 x 6.7 = -$33/ton DM (-$28 as-fed hay)

Add (subtract) that to nutrient value

Limitations

1. Assumed diet inclusion of 22 lbs;
   effect of quality should be correlated with inclusion

2. We assume effect is same for all milk yields
   but higher producing herds probably more sensitive

3. Based heavily on
   corn silage and alfalfa

Conclusions

1. This method values <u>all</u> major nutrients ($)
2. Method adjusts value ($) for expected effects on DMI and milk
3. Method does not require any additional lab assays

Sunrise over the Ohio River