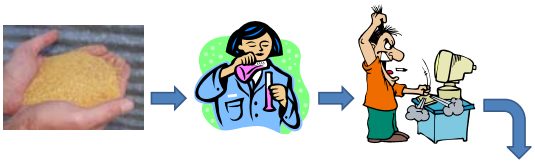
Interpretation and Use of Feed Analysis Data in Dairy Nutrition



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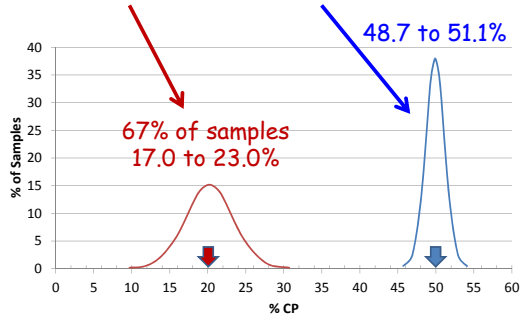
Feed Analysis or Forage Analysis ?

1. Adequacy of composition table data ?
2. Farm to farm, year to year variation ?
3. Inclusion rates ?
4. Impact on production ?

Table Values for CP

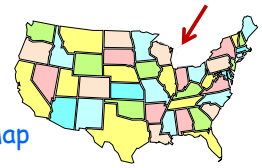
Alfalfa silage vs. Soybean meal



OSU Project: Quantify variation in feed composition **within** dairy farms

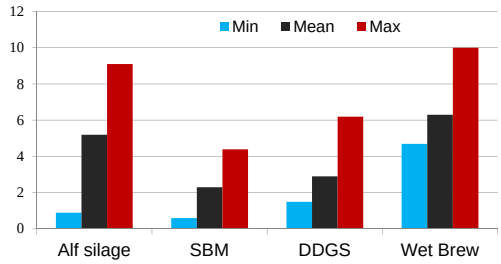
- 50 farms from across US (20 from OH)
- Feeds sampled monthly (12 months)
- TMR sampled monthly
- All assays by same commercial lab

Our "perfect" map



CP **WITHIN** farm ranges in CP%

Feeds were sampled over a 12 month period and were fed at least 5 months on a farm



	Alf silage	SBM	DDGS	Wet Brew
Farms	37	18	12	11

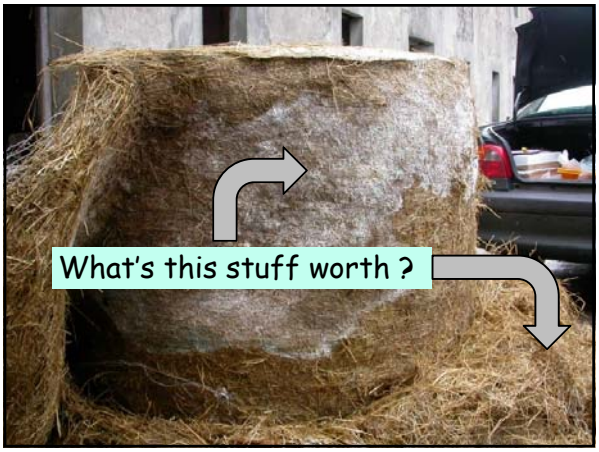
Inclusion Rate and Importance of Composition Data

Corn silage
Use **Average** within farm range for NDF
Inclusion rate: 35% of diet DM
Diet NDF range: 2.6 percentage units

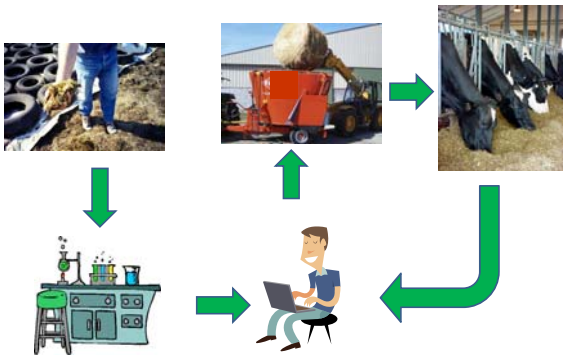
DDG
Use **Greatest** within farm range in NDF
Inclusion rate: 10% of diet DM
Diet NDF range 2.2 percentage units

Forage Evaluation: Use your eyes and nose

1. What is it? (grass, alfalfa, mix???)
2. Is it moldy?
3. Did it ferment well ?
4. Is the forage brown or black?

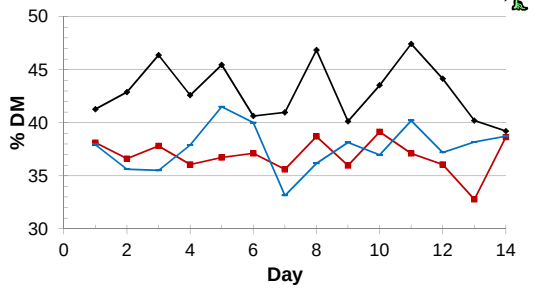


Evaluating Feed Composition



Evaluation starts with sampling

Corn Silage NDF, 3 farms

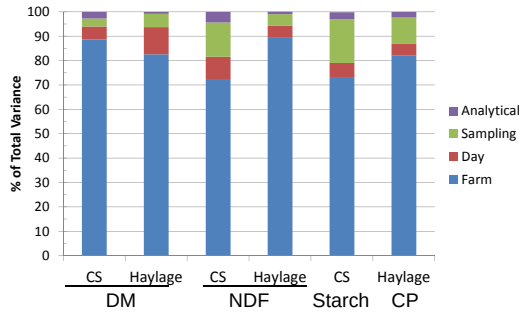


All variation is not created equal

Variation = Effect of farm +
True day to day differences +
Sampling variation +
Analytical variation

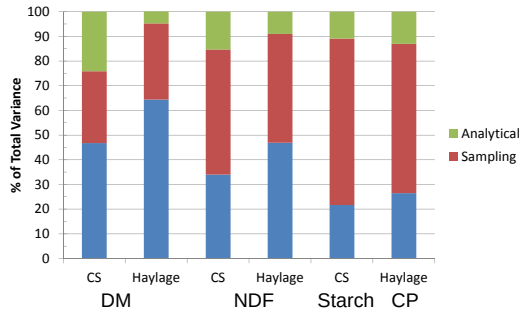
Cows may respond to day to day variation
Bad diets can be formulated because of sampling or analytical variation

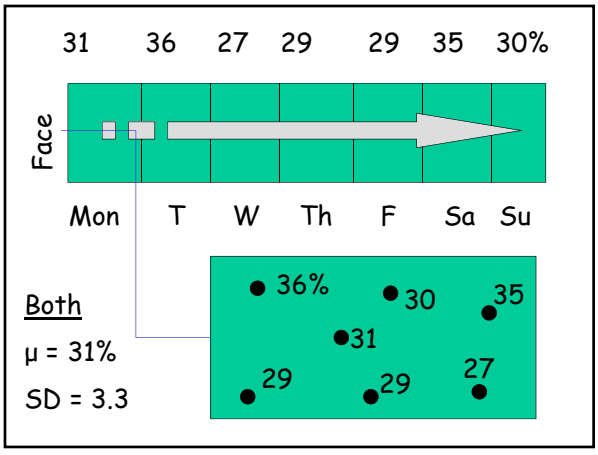
Partitioning Variance
Farm to farm is huge, but who cares?



Partitioning Within Farm Variance

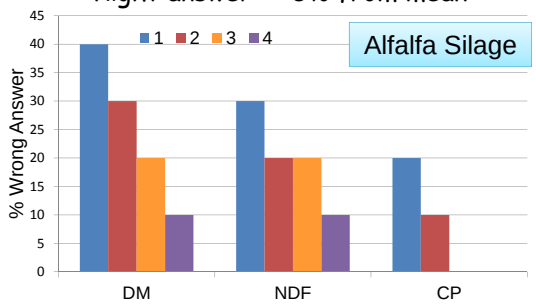
Sampling = 30 to 67% of day to day variance





How many samples were required to get the 'right answer'?

Right answer = <5% from mean



Good Sampling Practices

1. Mix as much as possible BEFORE sampling
2. For silage 5-10 handfuls is minimum
3. Don't allow sample to segregate
4. Mix before subsampling
5. Need data from **at least 2 samples**

The Lab Value Changed !

Don't Rush to Judgment:

Do you have reason to believe the feed actually changed?

YES → Use the new value

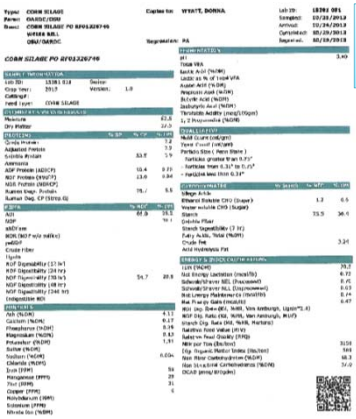
NO → Use a running average

Goals of Feed Evaluation

1. Accurate economic valuation
2. Determine optimal use

3. Formulate diets to optimize value

4. Figure out what is wrong



Lab sheet for corn silage

80 different potential assays

Economic Value of Feeds

The value of a feed should approximate the sum of the value of its nutrients

Forage provides protein, energy, and fiber

$/ton = Mcal NEL x $/Mcal + lbs MP x $/lb MP + lbs eNDF x $/lb eNDF + . . .

Economic Evaluation of Feeds

Cost of a feed = Σ value of its nutrients

Nutrient	Sept 2013 (Ohio)
NEL, $/Mcal	0.179
MP, $/lb	0.43
eNDF, $/lb	0.015
neNDF, $/lb	-0.17

See: **http://dairy.osu.edu** (Buckeye dairy news)

http://dairy.osu.edu

Example: Corn Silage

5% MP (8% CP)	100 lbs/ton DM
0.64 Mcal/lb NEL	1400 Mcal/ton
32% eNDF	640 lbs/ton
8% ne-NDF	160 lbs/ton

Sept, 2013 Central Ohio

MP =(100*0.43) NEL = (1400*0.18)
eNDF = (640*.015) neNDF = -(160*0.17)
Total = $277/T DM ($97/wet ton)

Essential Evaluation Data

1. Dry matter — Storage stability
2. NDF — Intake and milk potential
3. IVNDFD* — Intake and milk potential
4. Crude protein — Supplement costs
5. Ash — Energy, contamination

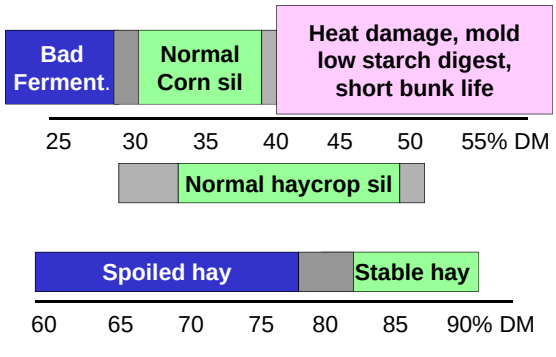
Ash

1. Indicates soil contamination
2. Dilutes energy
3. Can reduce intake
4. Can cause mineral deficiency problems

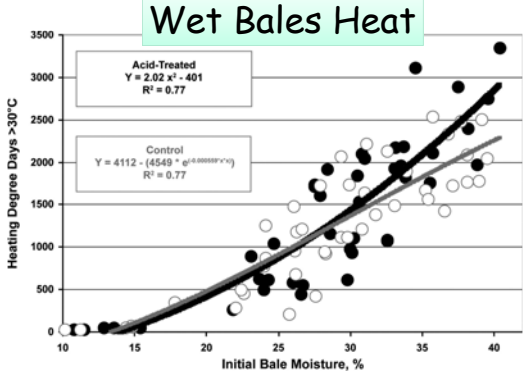
Potential Problems

Alfalfa hay:	>12%
Alf silage:	>13%
Grass hay:	>9%
Grass silage:	>12%
Corn silage:	>6

Effect of DM on Forage Storage

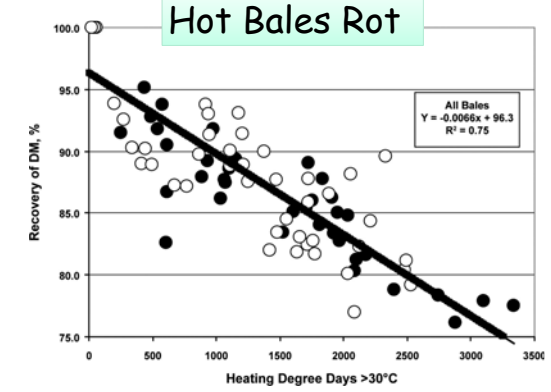


Wet Bales Heat



Coblentz and Bertram, 2012

Hot Bales Rot



Coblentz and Bertram, 2012

NDF Target GOAL

Legumes: ~35 to 42%

Grasses: ~50 to 53%

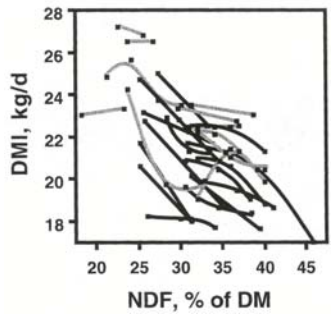
Mostly legume (HC = ~13): ~ 42 to 45%

Mix (HC = ~16): 44 to 48%

Mostly grass (HC = ~19): 46 to 49%

Corn Silage: ????

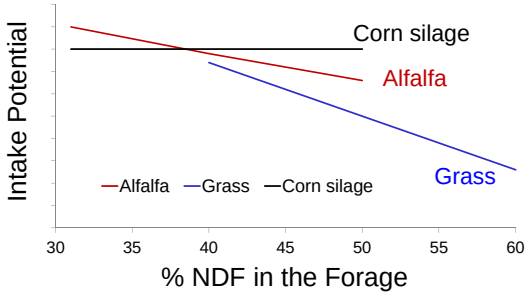
NDF from Forage affects DMI



Increasing NDF via forage **usually** reduces DMI

Allen, 2000

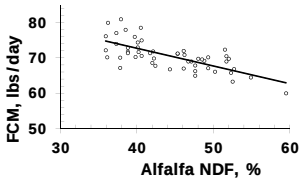
Higher Forage Fiber Usually Reduces Feed Intake



High NDF Haycrop forage: bad

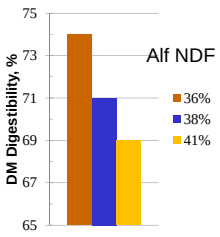
(⬇ profitability if NDF is too low)

-0.5 lbs/%



Weiss, 2007

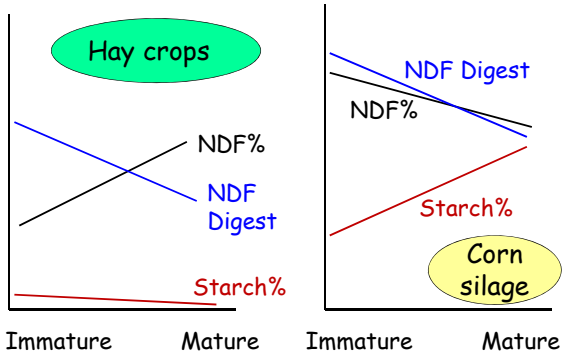
TMR digest (50% alf+50% conc)



Alhadhrani and Huber, 1992

Corn Silage is Different

% NDF (between ~35% to 50%):
- not related with DMI
- not related with digestibility
- not related with milk yield

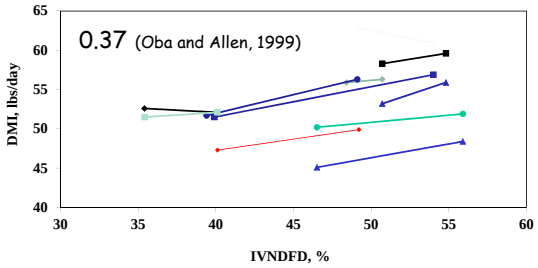


At least for corn silage: need IVNDFD (30 hours)

1. Correlation with NDF
   - High for hay crop forages
   - Very low for corn silage
2. Good for DMI and milk **RELATIVE** potential (but so is NDF for hay crop)
3. Compare to lab mean

Effect of Change in IVNDFD on DMI

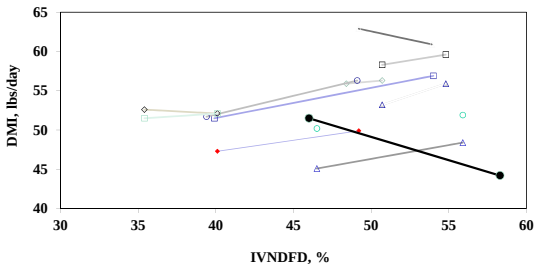
12 comparisons
Avg: **0.26 lbs**/IVNDFD unit = **0.5 lbs FCM**



Modified from Oba and Allen, 2005 TSDNC

Factors other than IVNDFD important

TMR NDF 40 vs 31% (35% test silage)



BMR SS vs CS (Dann et al., 2008)

I have high NDF, low IVNDFD forage. What now?

1. Sell it to a beef producer and buy good stuff

2. Limit diet forage NDF < 20%
   - Dilute with good forage and keep total diet NDF ~30%
   - Dilute with byproducts and keep total diet NDF ~35%

Other Potentially Useful Assays

Trouble shooting (may not fix a problem but might tell you why cows aren't milking)

Silage fermentation evaluation (pH, acetic, lactic, butyric acids)

1. Your nose will already know
2. 'Teachable moment'
3. Long term stability so feed out can be managed

Other Potentially Useful Assays

Trouble shooting (may not fix a problem but might tell you why cows aren't milking)

In vitro starch digestion (corn silage)

1. If low, consider adding fermentable starch to diet
2. If high, consider reducing total starch

The Big Problem is:
What is 'Low' and What is 'High'

Particle Size Distribution (Silage only)

Measure during silo filling
(and adjust chopper as needed)

1. Too fine: rumen problems and low milk fat
2. Too coarse: sorting, rumen problems, low milk fat
3. Too coarse: chopped forage may not pack correctly

Silage Particle Size

Targets

	Corn silage	Haylage
Top*	3 – 5%	10 – 15%
Middle	45 – 65%	30 – 50%
Pan	30 – 40%	30 – 50%

*Drier silage should be at low end

Summary

Get **good** feed analysis data

- Take good samples
- Take adequate samples

Use/interpret the data

- Put value on needed nutrients
- Match appropriate forage to cows
- Make diet modifications