Cincinnati Section

- Check Samples

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Today's Presentation

- Cinn. Section Cookie Check
  - Moisture, Dough Weight, Width, Thickness, W/T Ratio, Spread Factor
  - Monthly Means
  - Individual Lab Differences
- Cinn. Section Flour Check
  - Regular–Moist, Protein, Ash, pH, FallNo
  - SRC – Visc, Water, Sucrose, C'nate, LactAcid
  - Monthly Means
  - Individual Lab Differences
- AACCI Check Sample Series B – Soft Wheat
  - Regular–Moist, Protein, Ash, pH, FallNo
  - Averages
  - Individual differences

Check Samples

- AACC International introduced the Check Sample Service in 1948 to:
  - Test equipment.
  - Monitor the use of proper methodology among laboratory personnel.
  - Qualify the work of contract laboratories.
  - Ensure the accuracy of labeling information

Check Sample Procedure

- 1) You subscribe to a series
- 2) AACCI sends test samples
- 3) You analyze the samples
- 4) You report your results back to AACCI
- 5) AACCI processes the results from all labs
- 6) You compare your results to other labs

Reference Material vs. Check Samples

- Known
- Calibration
- Method Development

- Unknown
- Quality Control

Reference Material	Check Samples

- An Analytical Procedure is an orderly step-by-step instruction designed to ensure operational uniformity and to minimize uncertainty

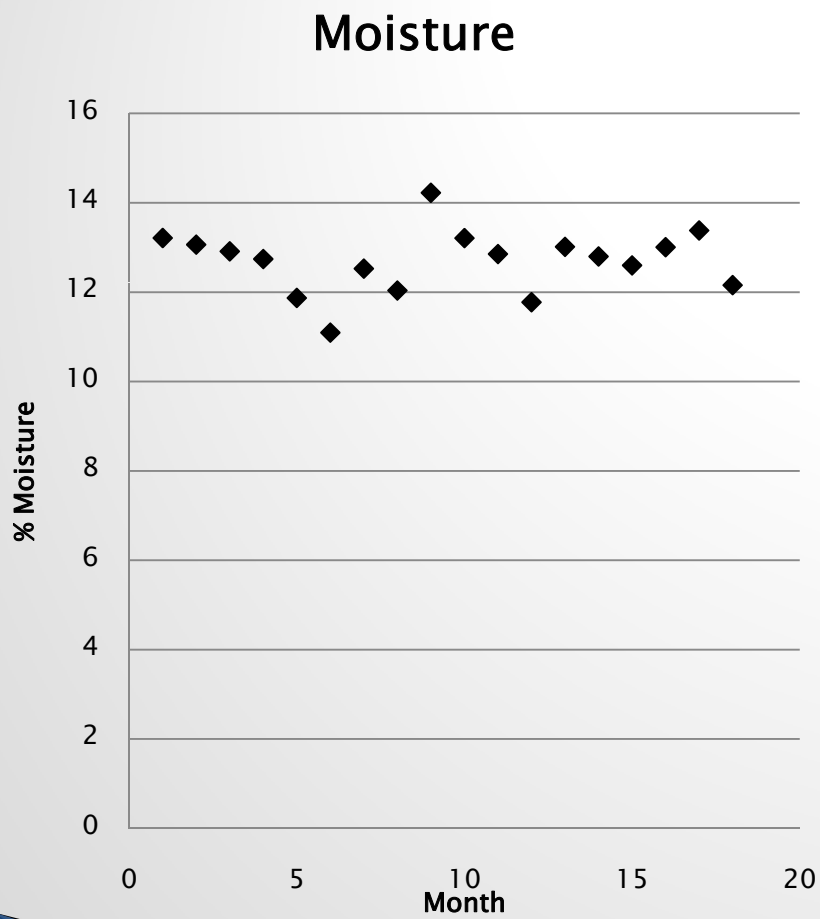
- What could possibly go wrong?
  - (Murphy's Law)

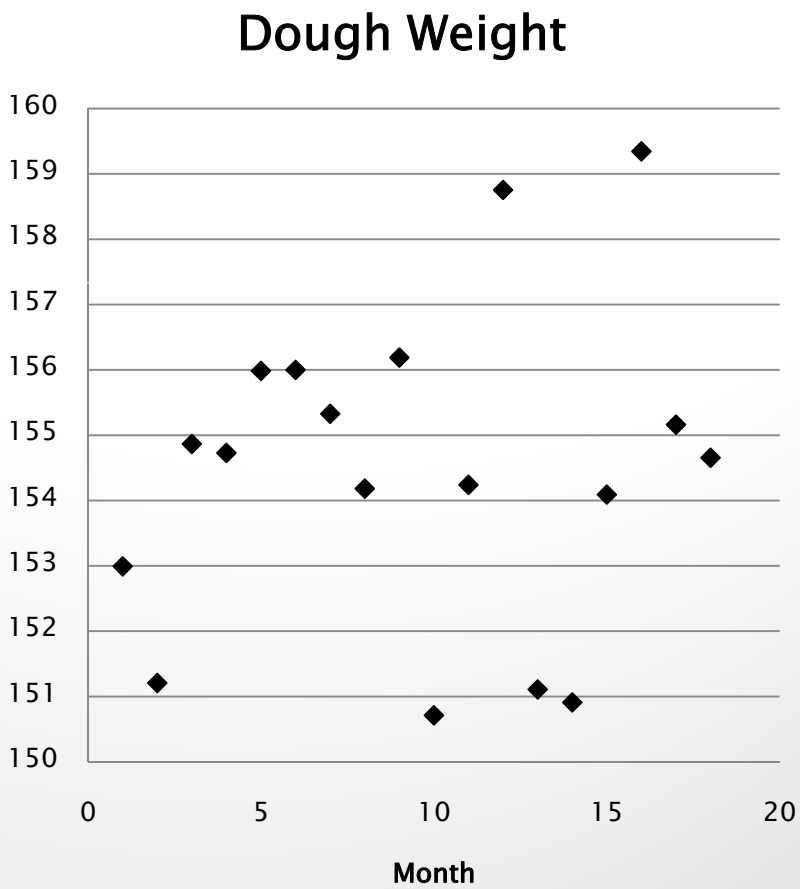
Cookie Check

- Flour Moisture
- Dough Weight of 6 Cookies
- Width of 6 Cookies
- Thickness of 6 Cookies
- W/T Ratio
- Spread Factor (W/T x CF x 10)

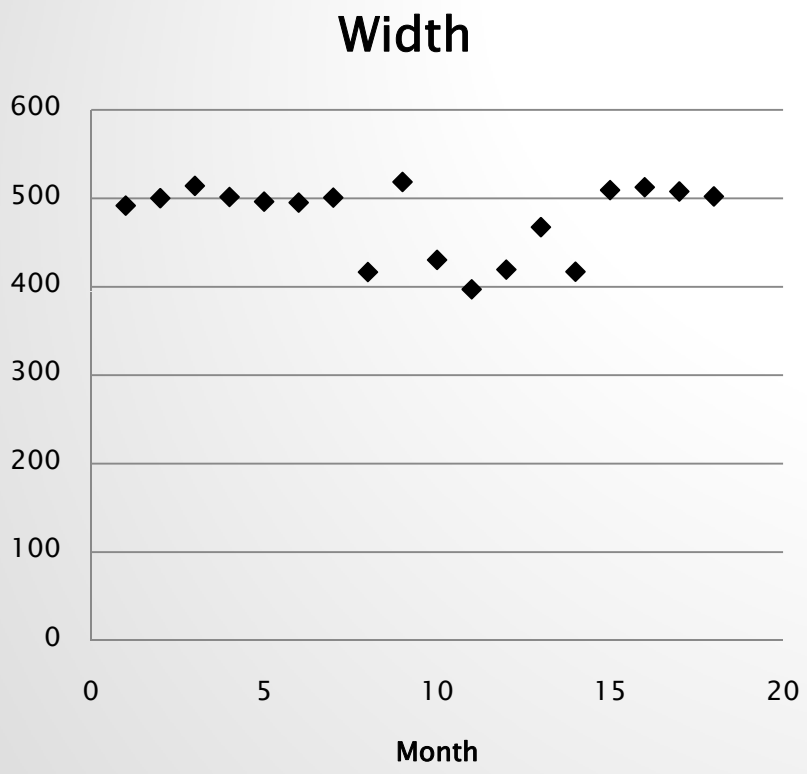
- 14 Subscribers in Cinn. Section
- Data from 2007-2009, 6 times per year

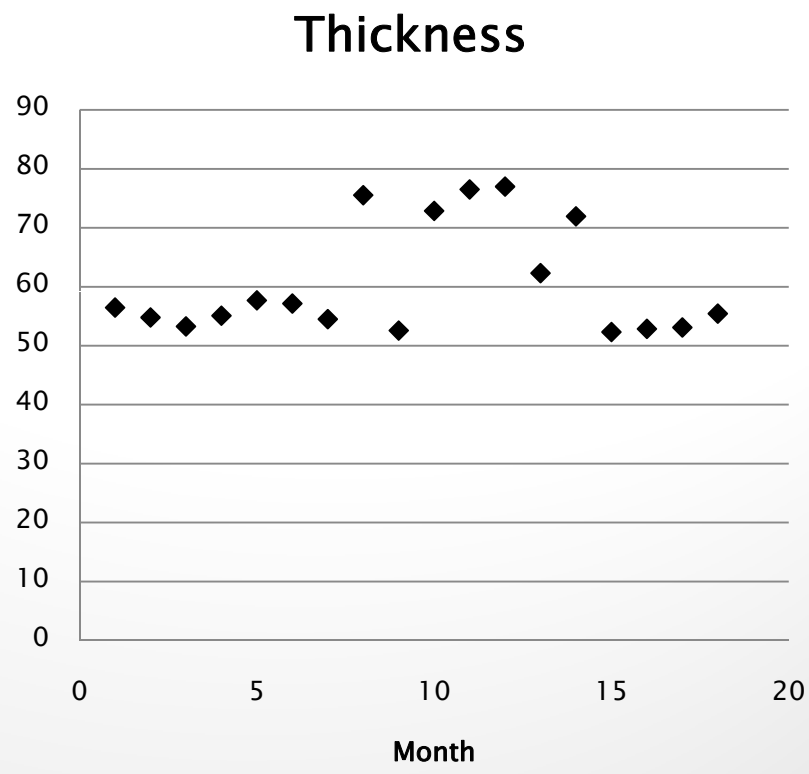
Monthly Means



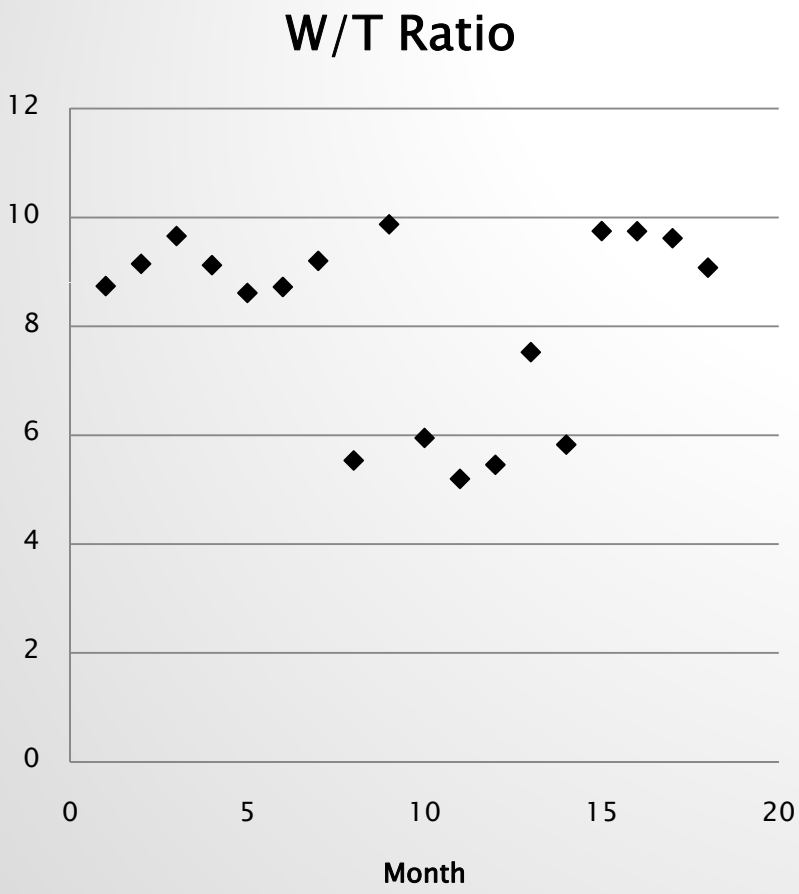


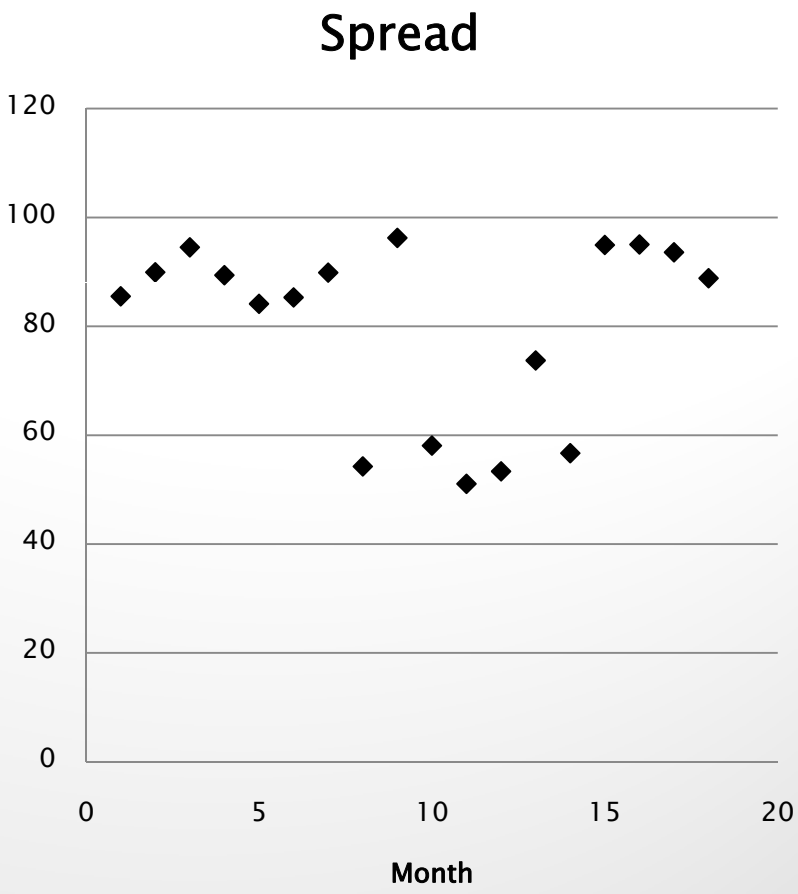
Monthly Means





Monthly Means

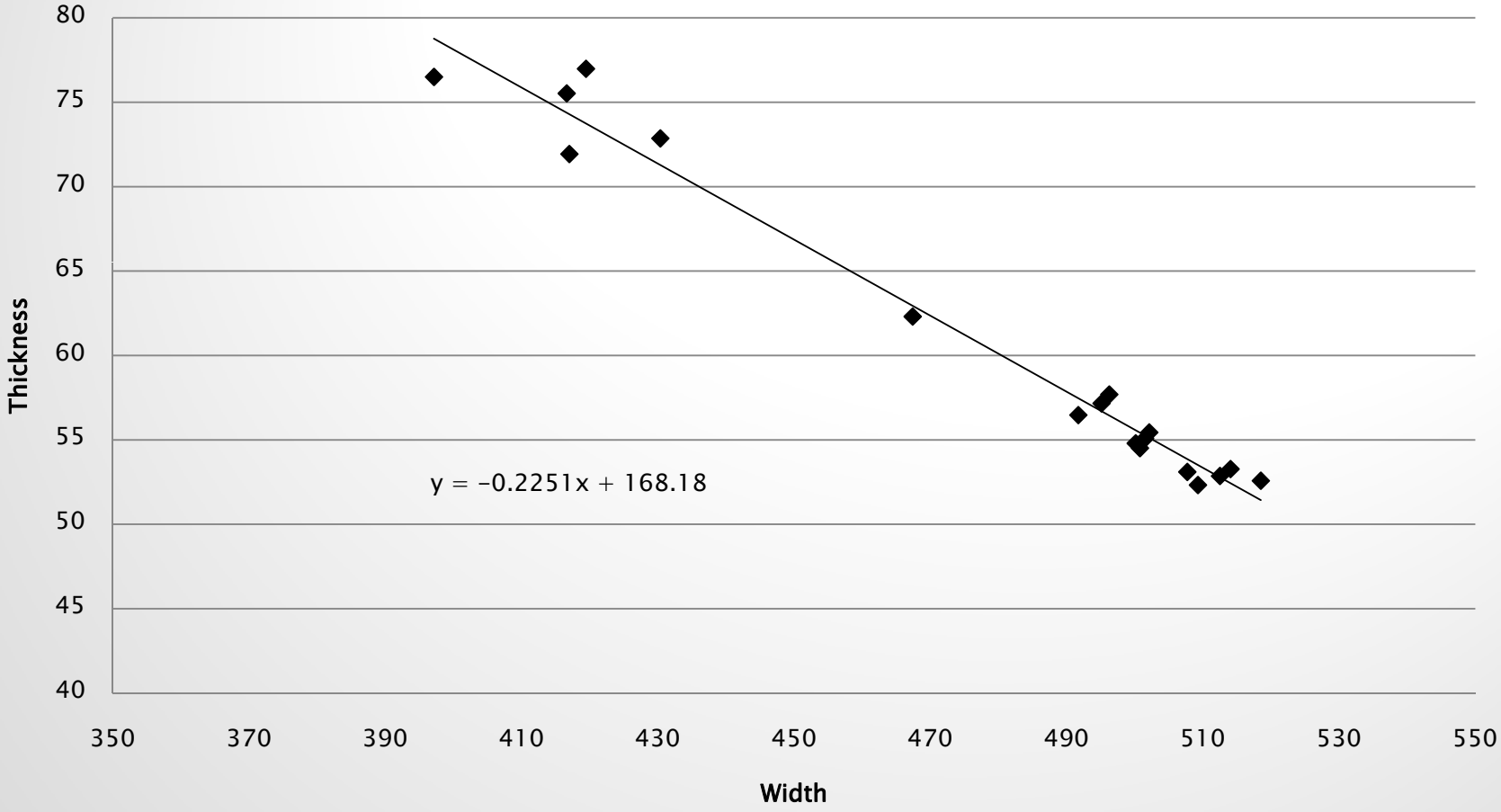




Correlations

	Dough Wt	Width	Thickness	W/T Ratio	Spread
Moisture	-.28	.20	-.24	.25	.25
Dough Wt		.27	-.21	.26	.26
Width			-.99	.99	.99
Thickness				-.99	-.99
W/T Ratio					1.00

Width and Thickness



Overall Means

Variable	N	Mean	Std Dev	CV
Moisture	218	12.70	.73	5.76
DoughWt	187	154.88	7.76	5.01
Width	218	479.41	42.18	8.80
Thickness	218	60.58	9.56	15.77
W/T Ratio	218	8.19	1.77	21.57
SpreadF	218	80.05	17.19	21.47

Individual Results

"Snapshot"

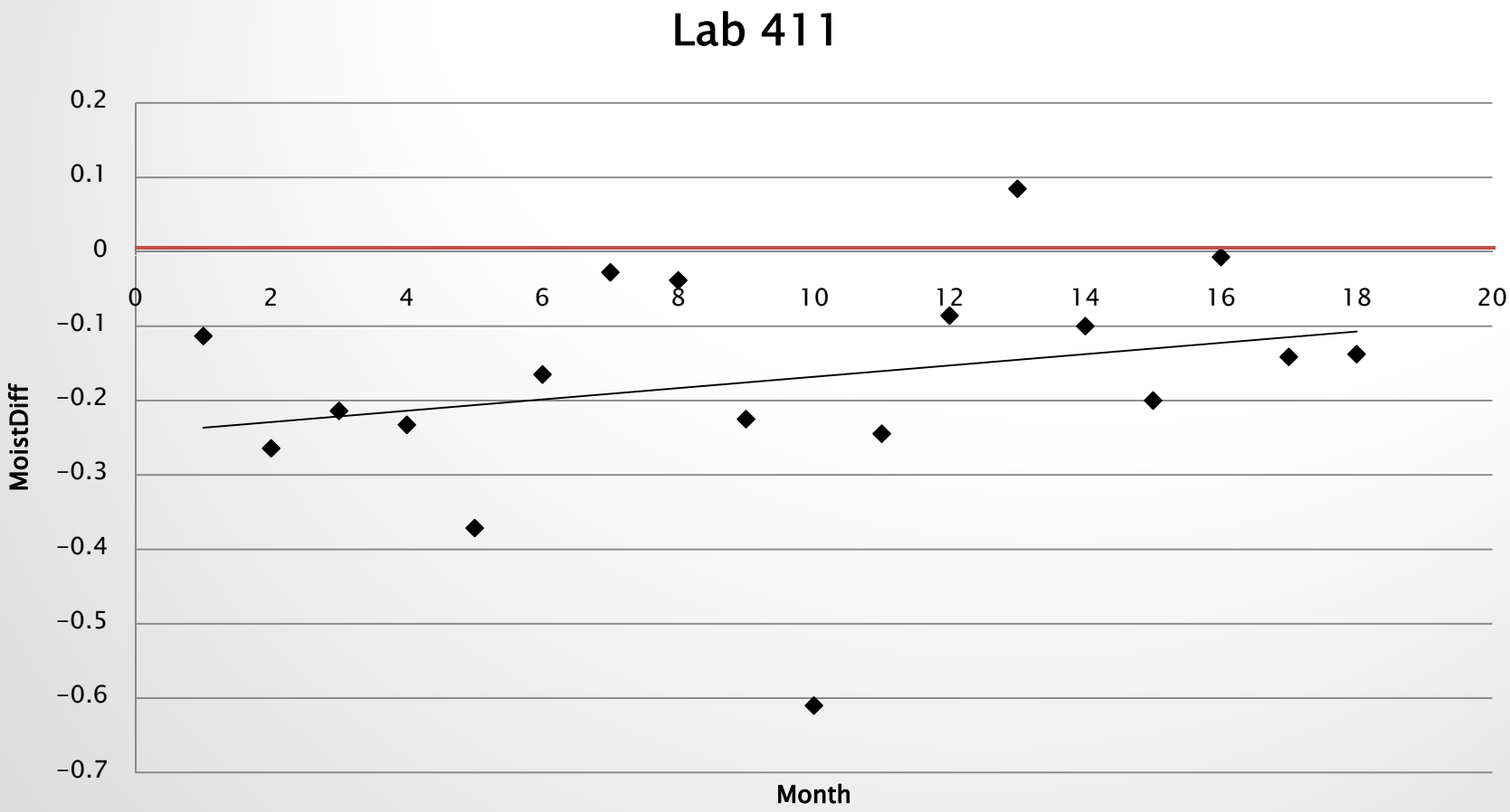
- report differences from the group average
- drop minus signs
- report "average miss"

- Look for:
  - consistent bias
  - Time trends

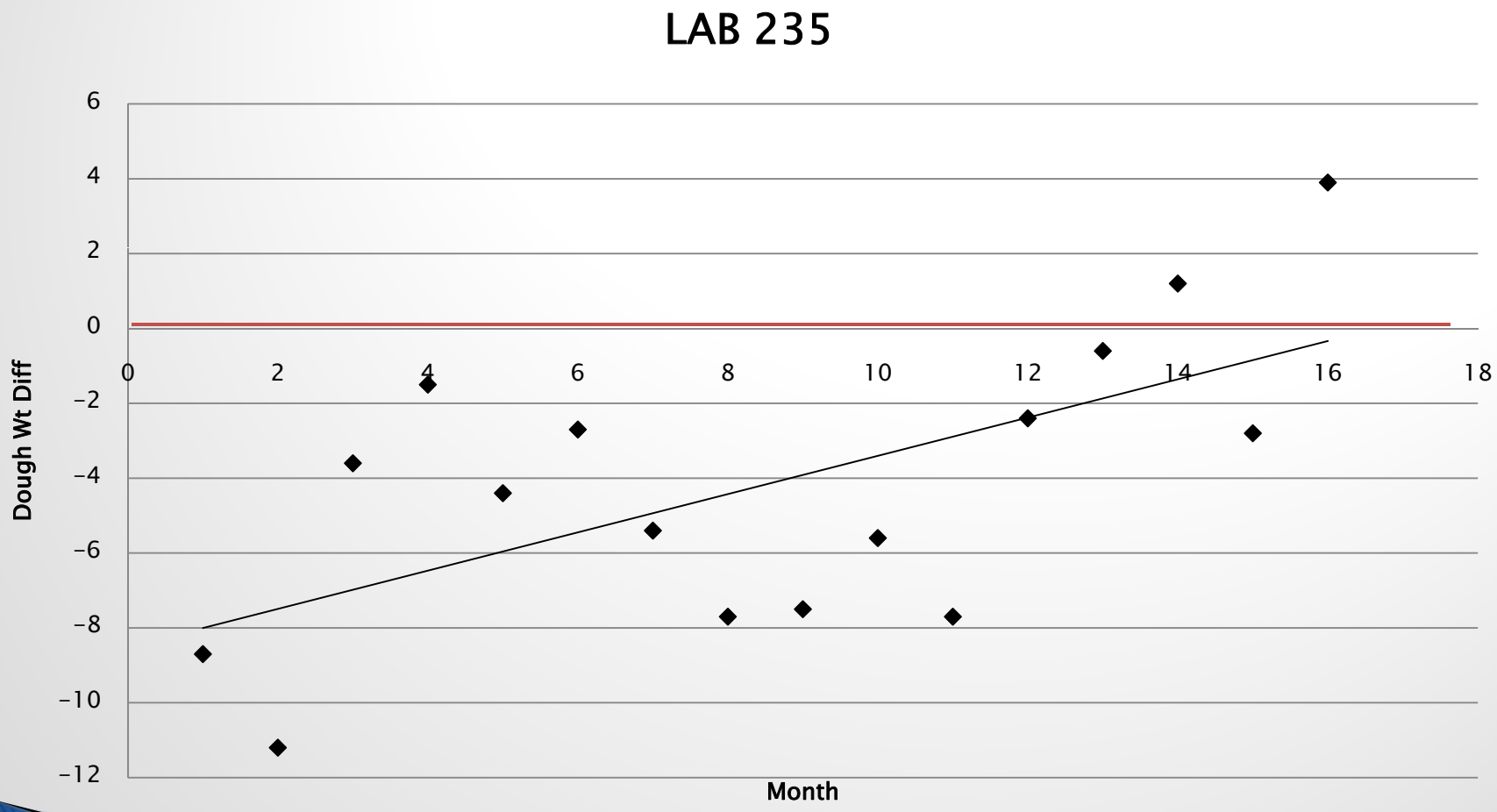
Regular Check Samples

Analysis over time

Moisture Differences



Dough Wgt Differences



Probability of Bias

# Above	# Below	Prob1	Prob2
0	18	0.000	0.000
1	17	0.000	0.000
2	16	0.001	0.001
3	15	0.004	0.003
4	14	0.015	0.012
5	13	0.048	0.033
6	12	0.119	0.071
7	11	0.240	0.121
8	10	0.407	0.167
9	9	0.593	0.185
10	8	0.760	0.167
11	7	0.881	0.121
12	6	0.952	0.071
13	5	0.985	0.033
14	4	0.996	0.012
15	3	0.999	0.003
16	2	1.000	0.001
17	1	1.000	0.000
18	0	1.000	0.000

13 labs with >14 reports

	Moisture	Dough Wt	Width	Thickness	W/T Ratio
# High	3	2	4	4	4
# Low	2	3	4	3	5
% biased	38	38	62	54	69
# Trends	1	1	1	0	1

Flour Checks

Cinn Section Flour Checks

	Ave	low	high
Moist	12.48	9.65	13.72
Protein	8.18	7.38	9.16
Ash	.444	.323	.501
pH	5.57	4.49	6.09
FallNo	383	295	473

	Ave	low	high
Viscosity	48.2	39.0	68.1
Water	55.2	51.9	59.4
Sucrose	95.0	90.0	103.5
C'bonate	71.0	63.6	76.9
LactAcid	88.6	73.9	97.6

Average for 12 months of 2009

Regular

SRC

Cinn Section Flour Checks

	n	Ave	cv
Moist	327	12.50	8.9
Protein	326	8.18	8.2
Ash	271	.444	13.5
pH	327	5.57	12.4
FallNo	327	385	15.3

	n	Ave	cv
Viscosity	36	46.0	17.8
Water	63	55.2	5.3
Sucrose	61	95.3	6.4
C'bonate	62	71.3	5.3
LactAcid	63	88.0	9.2

Average for 12 months of 2009

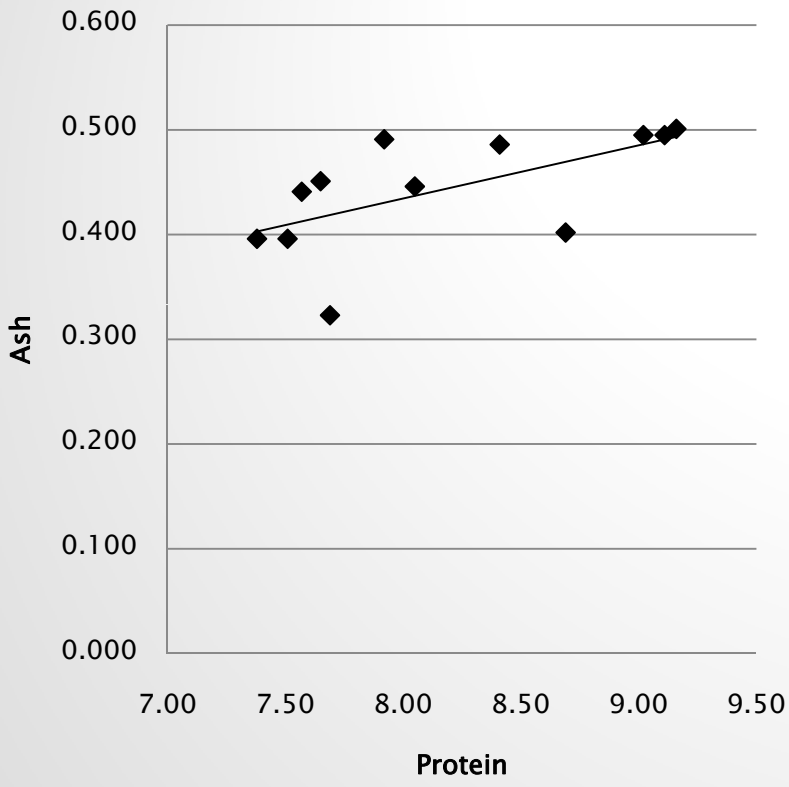
Regular

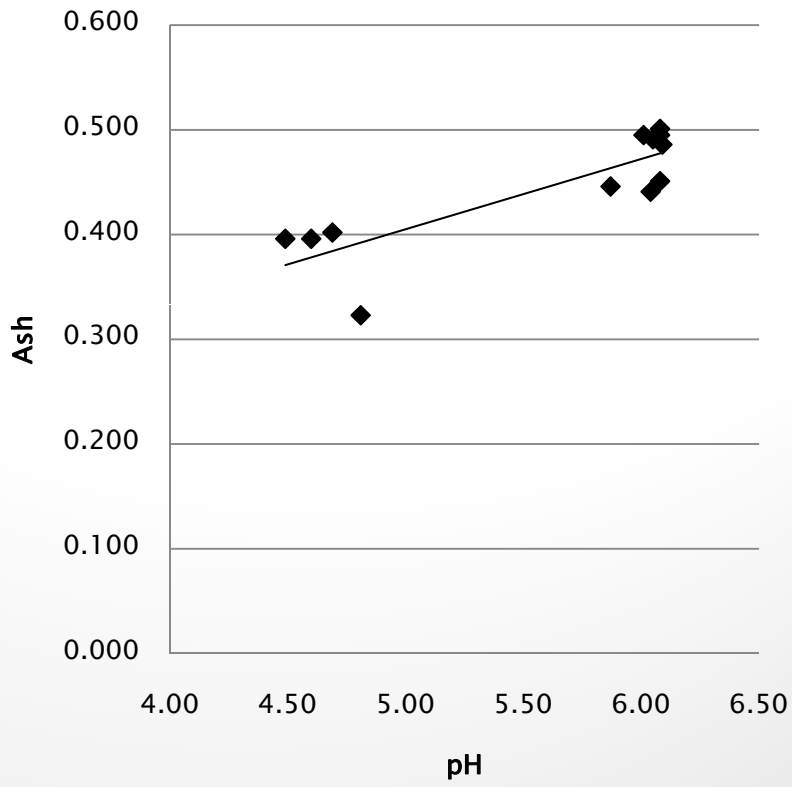
SRC

Correlations among Monthly Means of Regular Measures

	Protein	Ash	pH	FallNo
Moisture	.23	-.04	.03	-.15
Protein		.62*	.43	-.13
Ash			.84**	-.44
pH				-.81**

Ash Graphs



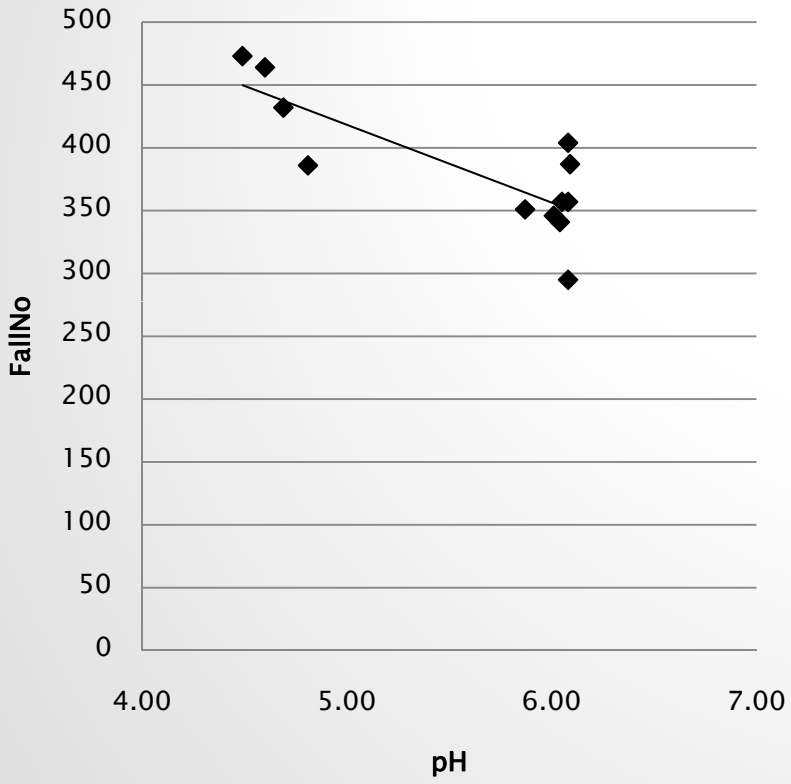


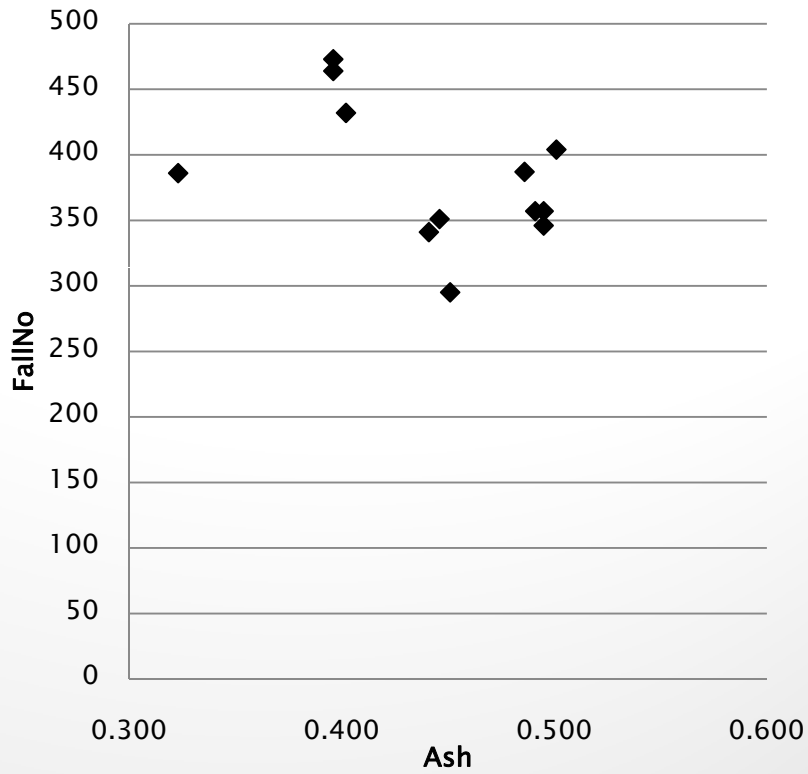
Protein and Ash

pH and Ash

Data Points are monthly averages-2009

FallNo Graphs





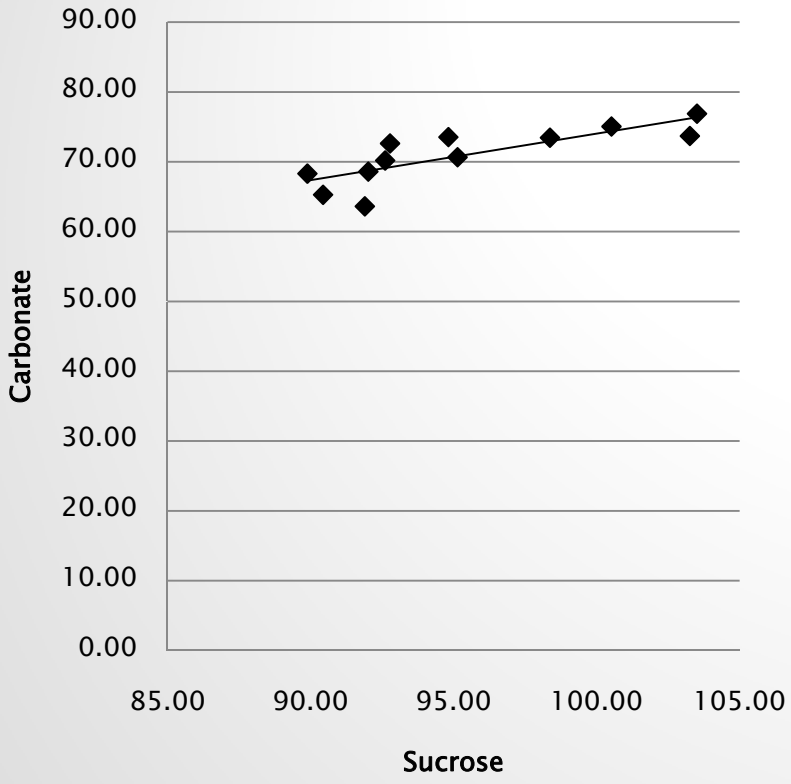
pH and FallNo

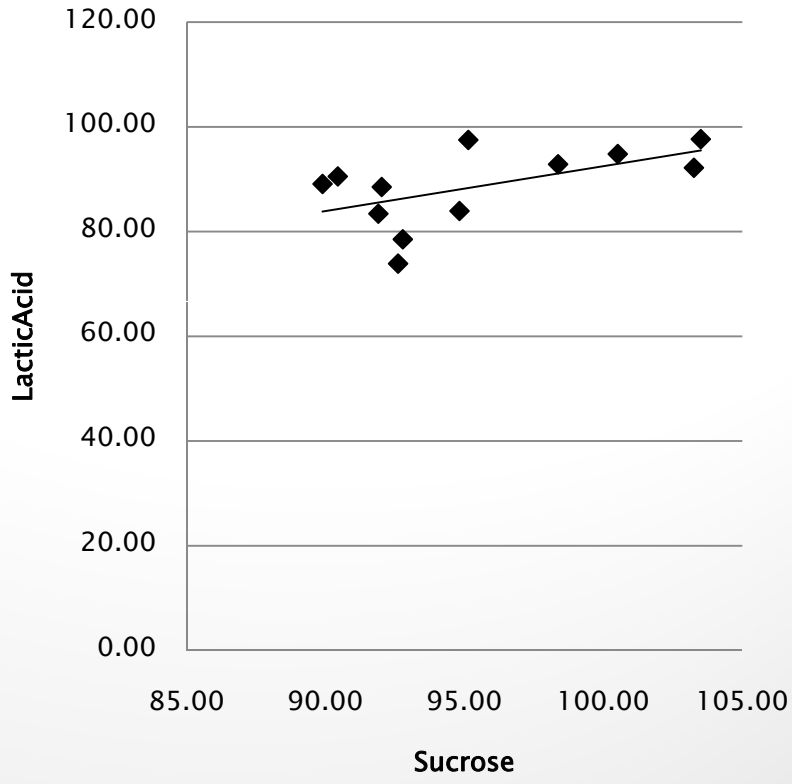
Ash and FallNo

Correlations among SRC Means

	Water	Sucrose	Carbonate	LacticAcid
Viscosity	.09	-.06	-.26	.25
Water		.31	.50*	-.19
Sucrose			.81**	.56*
Carbonate				.33

Sucrose graphs





Sucrose and Carbonate

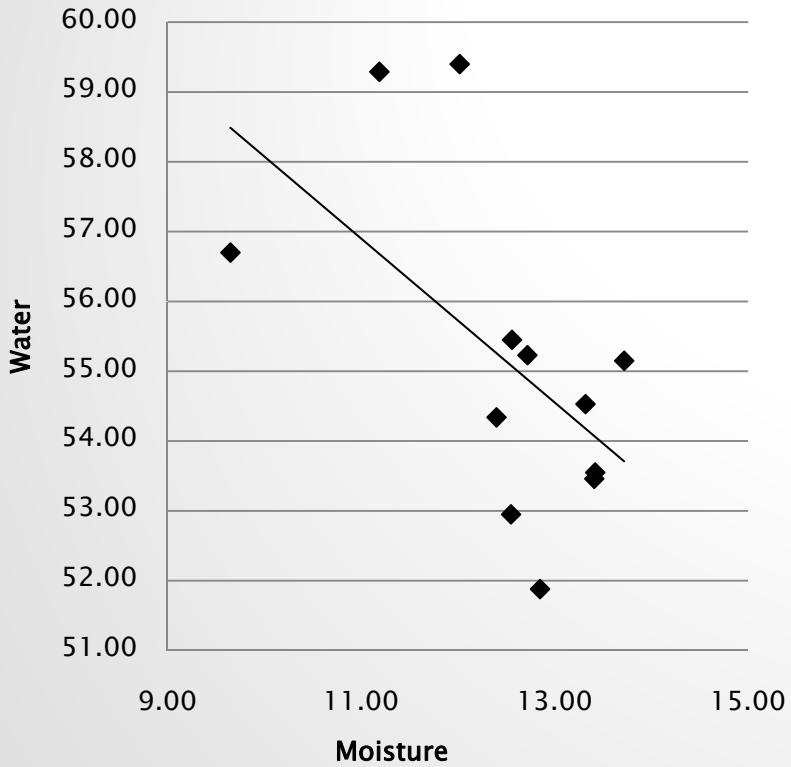
Sucrose and LacticAcid

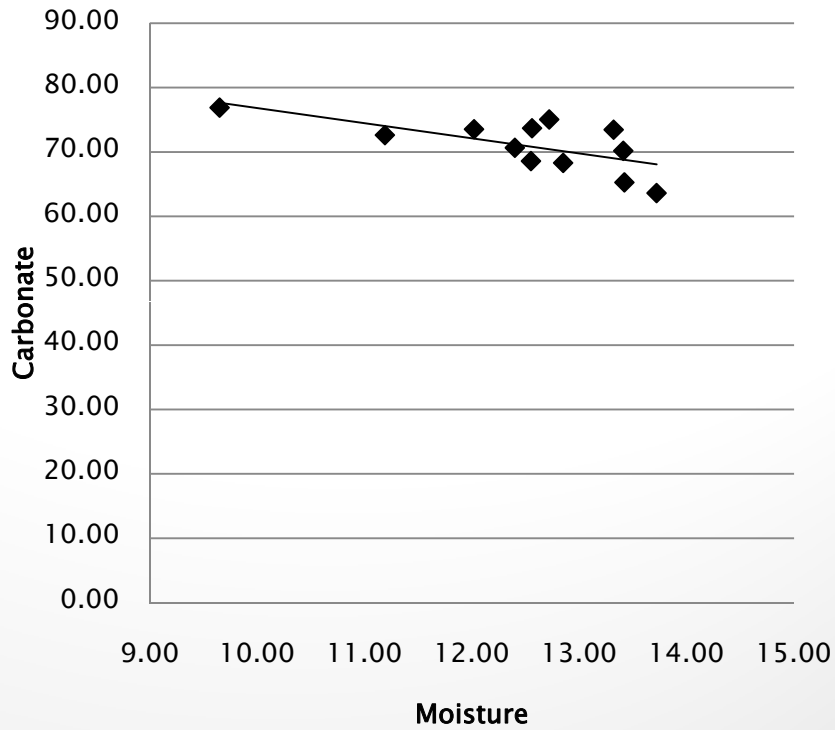
Correlations between Regular and SRC Measures

	Viscosity	Water	Sucrose	Carbonate	LacticAcid
Moisture	-.05	-.57*	-.47	-.67*	-.26
Protein	-.31	-.34	.17	-.16	.02
Ash	-.77*	-.30	.43	.40	.20
pH	-.50	-.62*	.39	.32	.46
FallNo	.24	.78**	-.08	-.04	-.41

**p<.01, *p<.05

Moisture Graphs

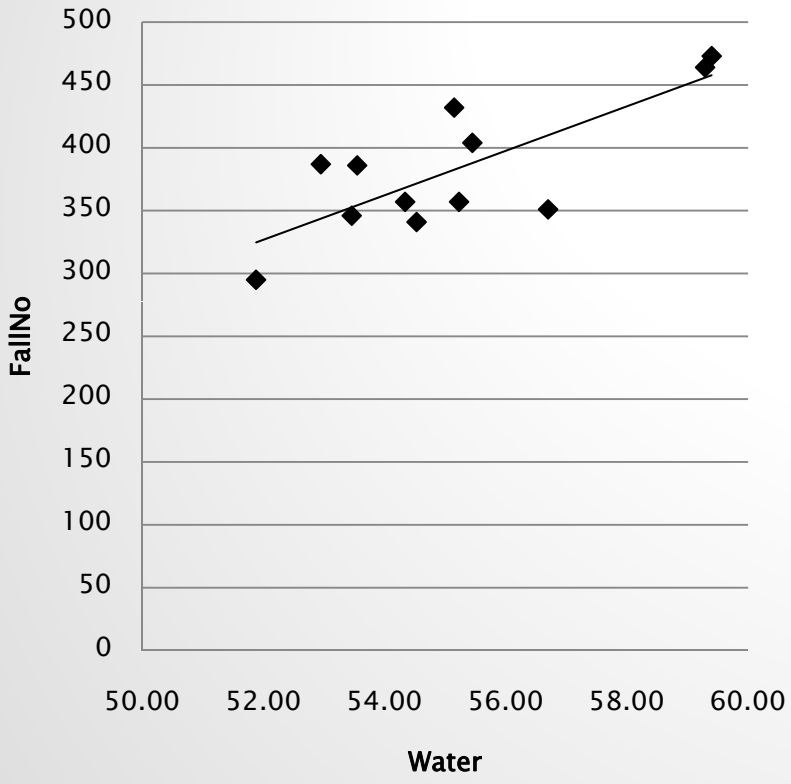


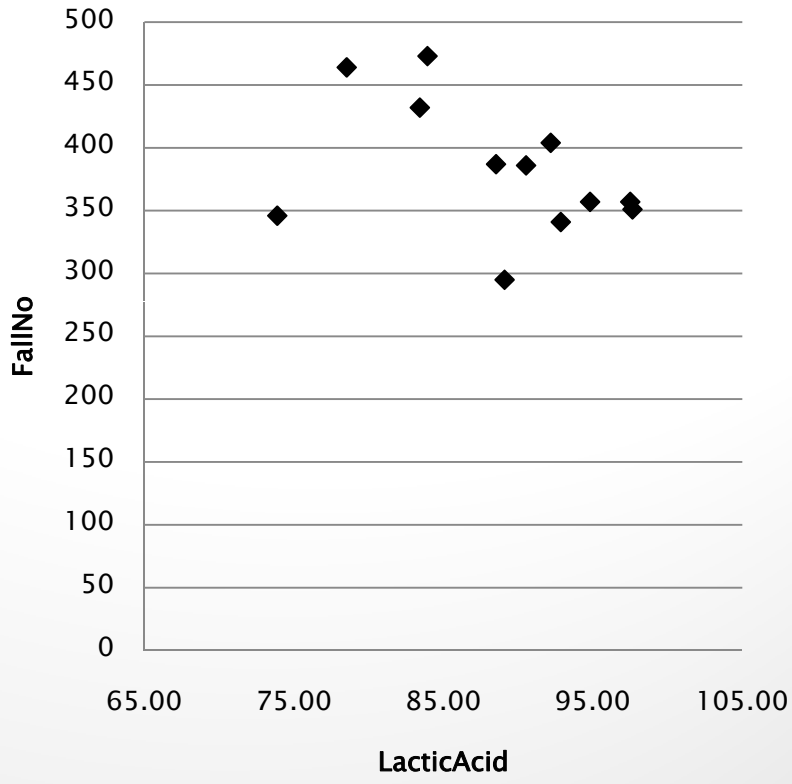


Moisture and Water

Moisture and Carbonate

FallNo Graphs





FallNo and Water

FallNo and LacticAcid

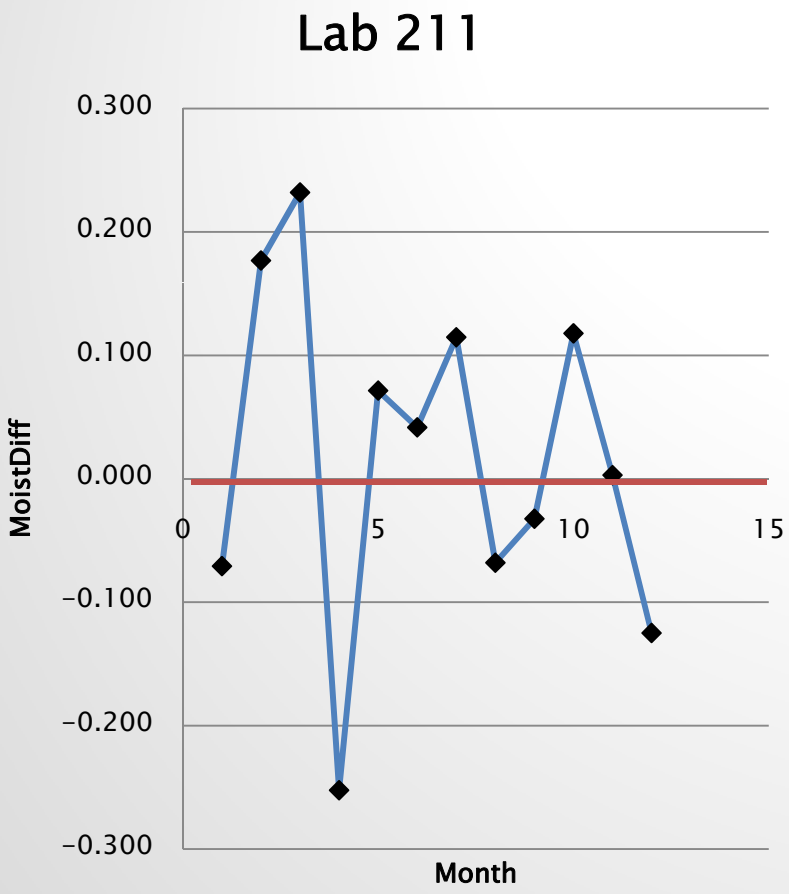
Predict Falling Number

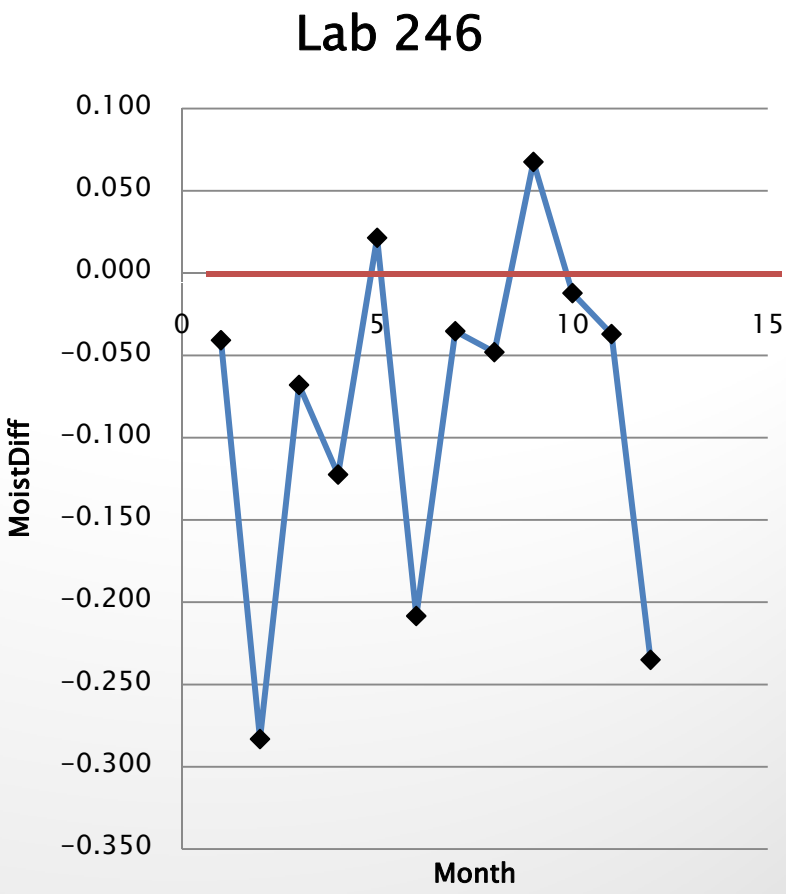
- FN = 680 + 400*Ash – 85*pH

Individual Labs

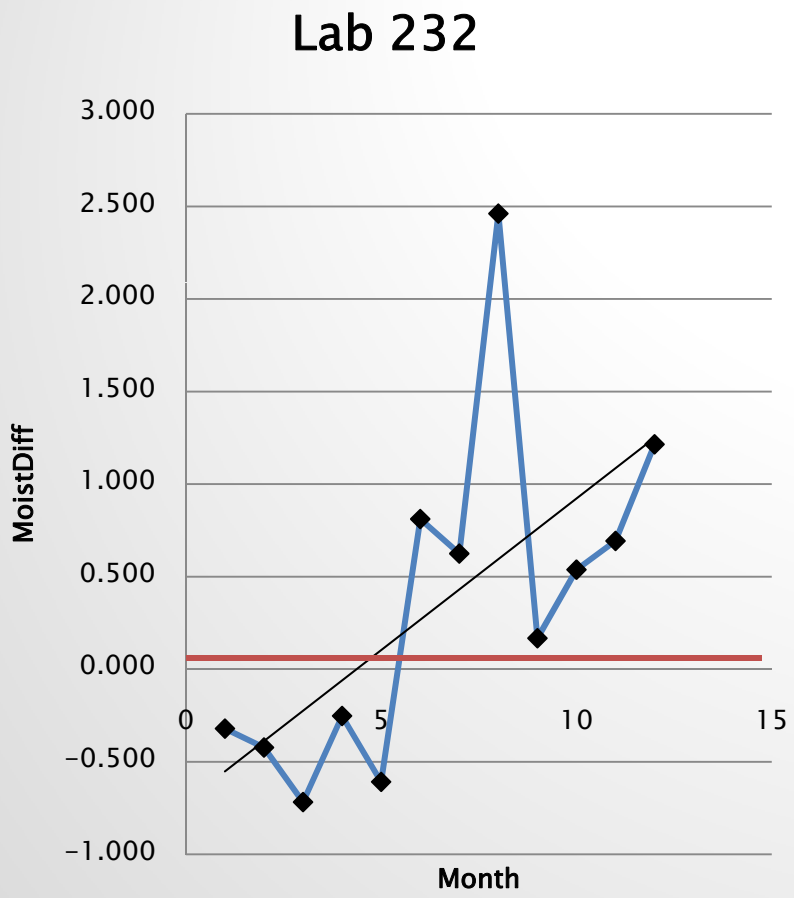
Differences from the Mean

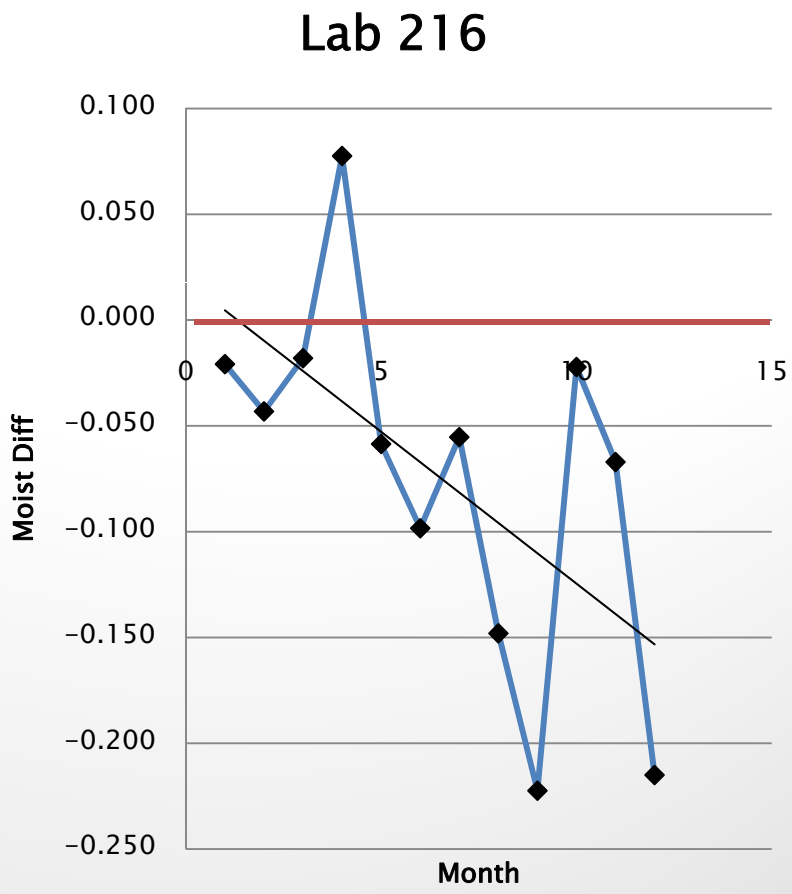
Moisture Differences





Moisture Differences (2)





Significant Biases & Trends

	Biased	Biased %	Trends	Trend %
Moisture	13/40	32	4/40	10
Protein	3/28	11	6/28	21
Ash	10/36	28	4/36	11
pH	14/33	42	4/33	12
FallNo	14/34	41	5/34	15

Conclusions

- Check Samples are Useful
- Look at Results over Time
  - (put minus signs back in)
- Methods can be biased
  - Sample Prep
  - Equipment Wear
  - Reagents age
  - Consistent differences in technique

AACCI Check Samples
Series "C" –Soft Wheat Flour

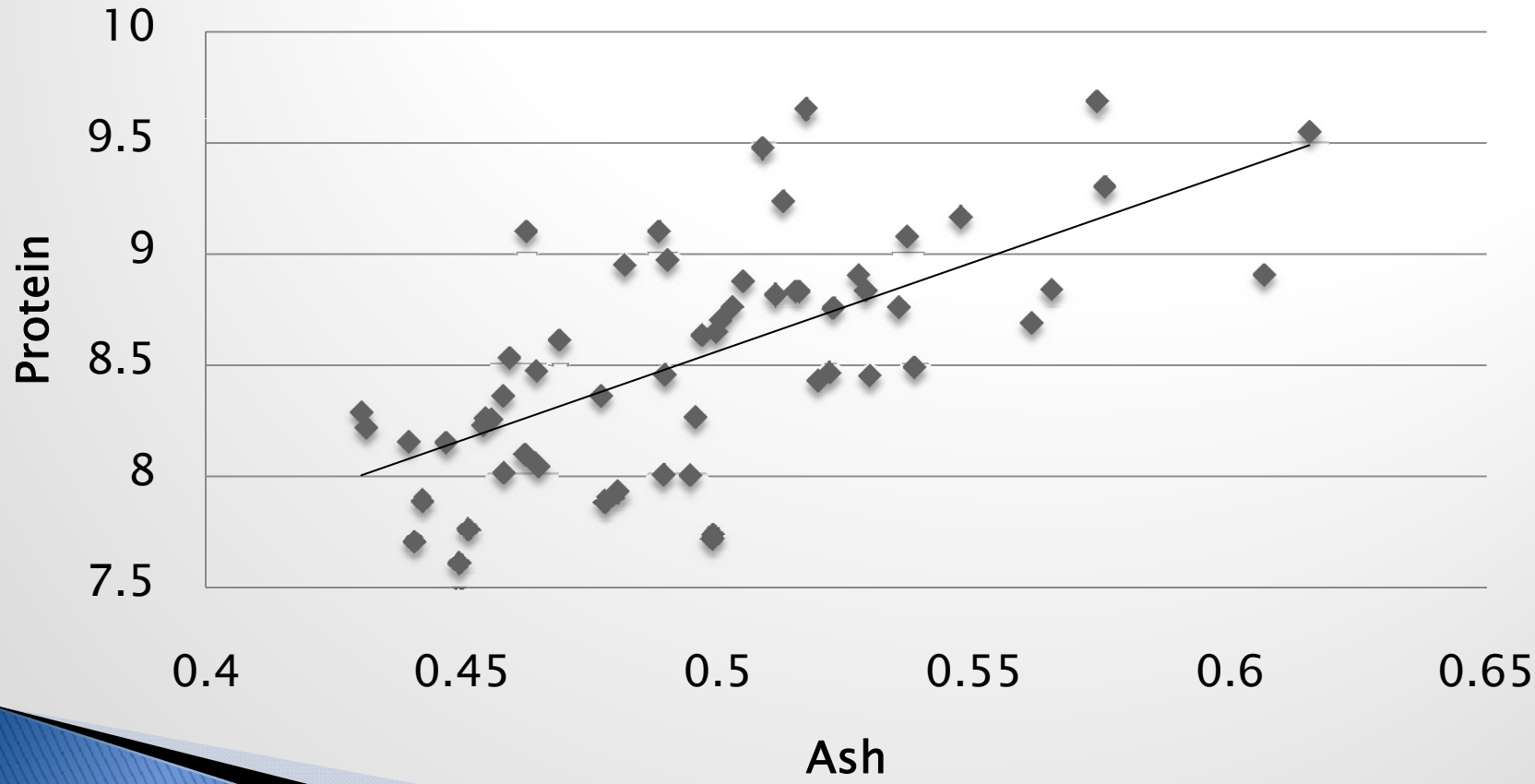
- Moisture
- Protein
- Ash
- pH
- Falling Number

- (Bi-Monthly)

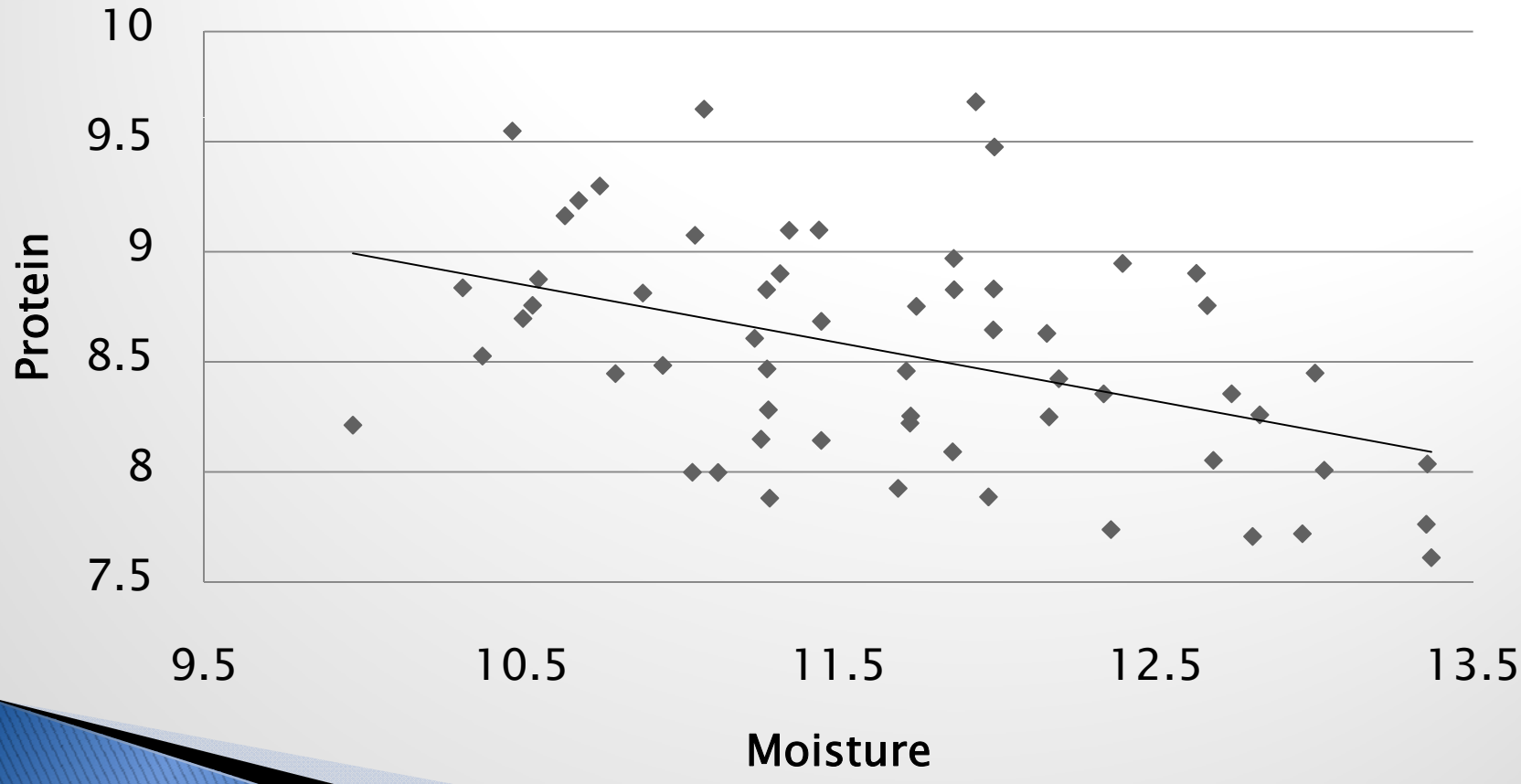
Correlations

	Moisture	pH	Protein	Falling No
Ash	-.26*	.06	.66**	.22
Moisture		.15	-.44**	-.20
pH			-.16	-.61**
Protein				.43**

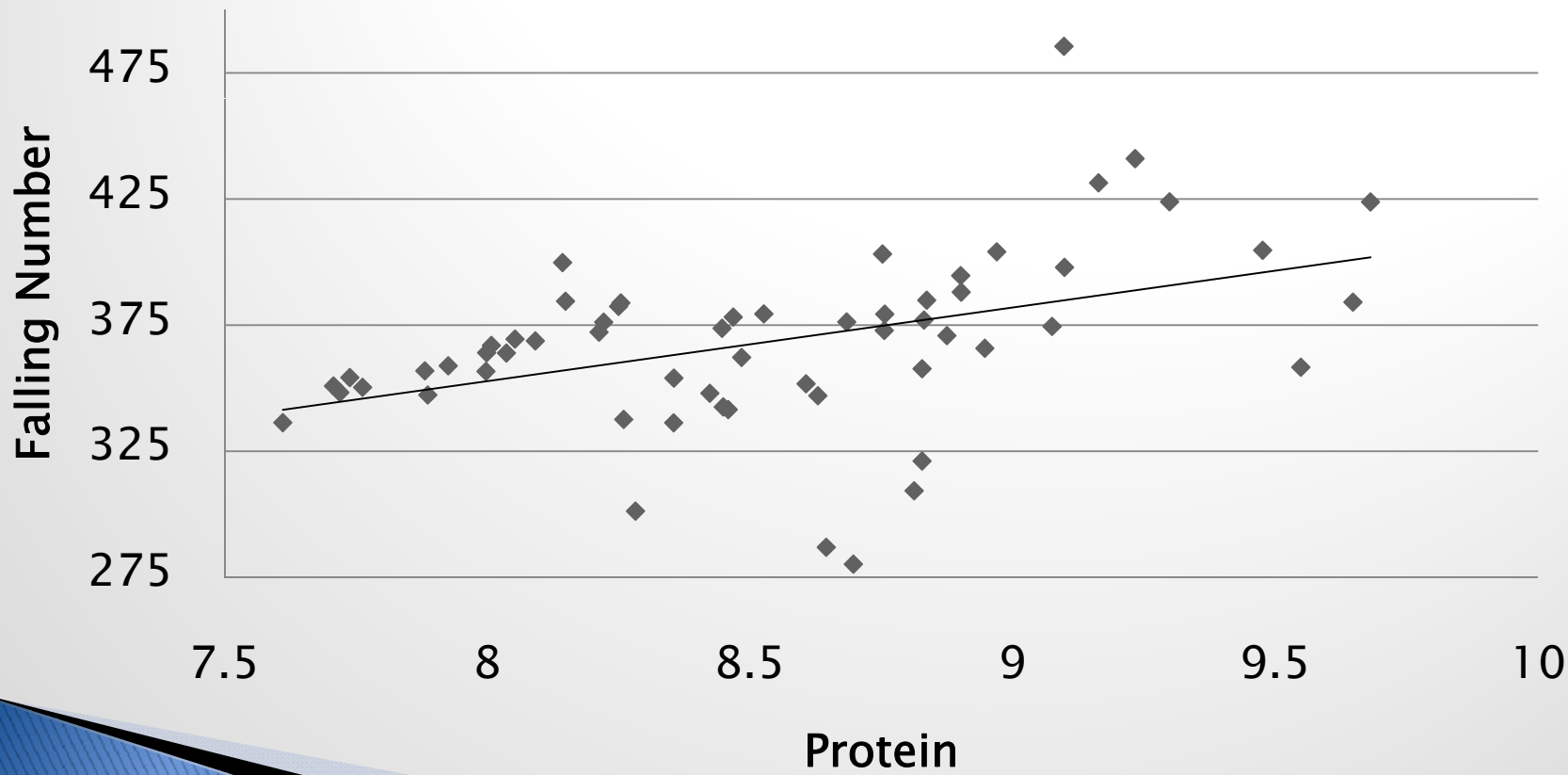
Ash and Protein



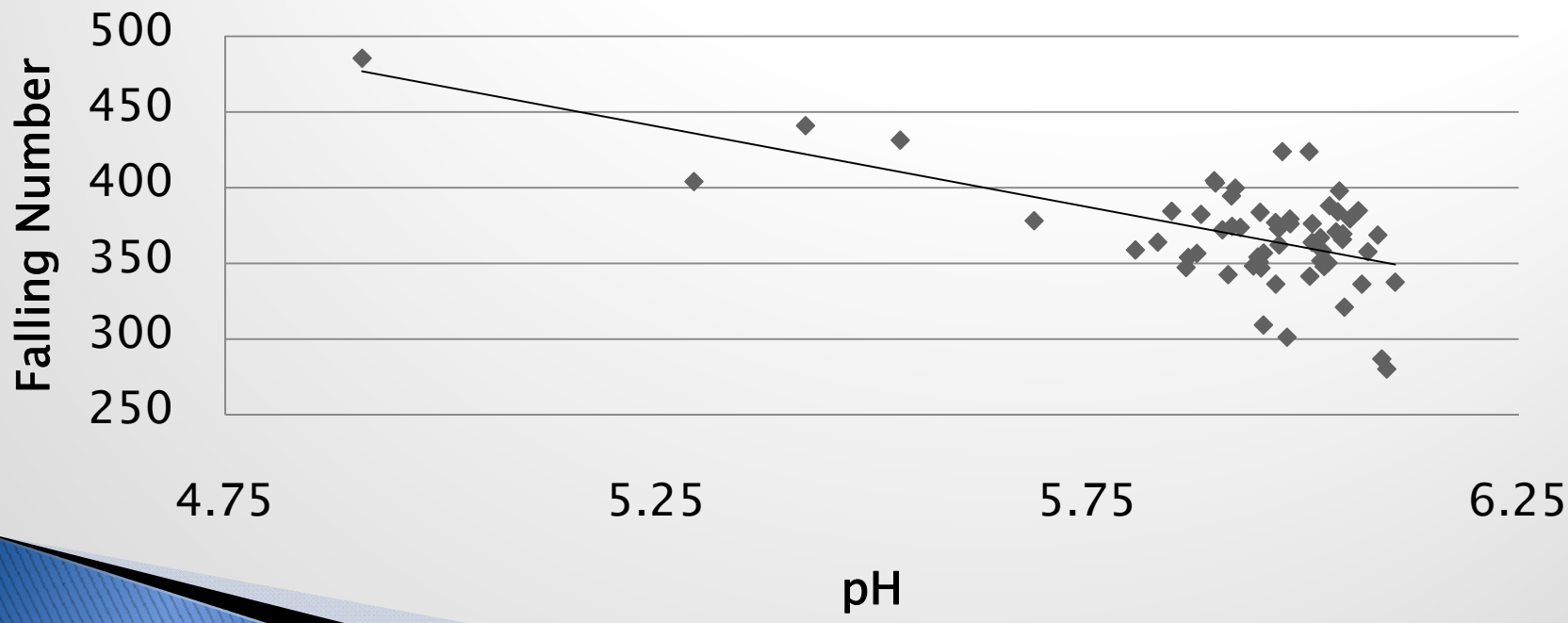
Moisture and Protein



Protein and Falling Number



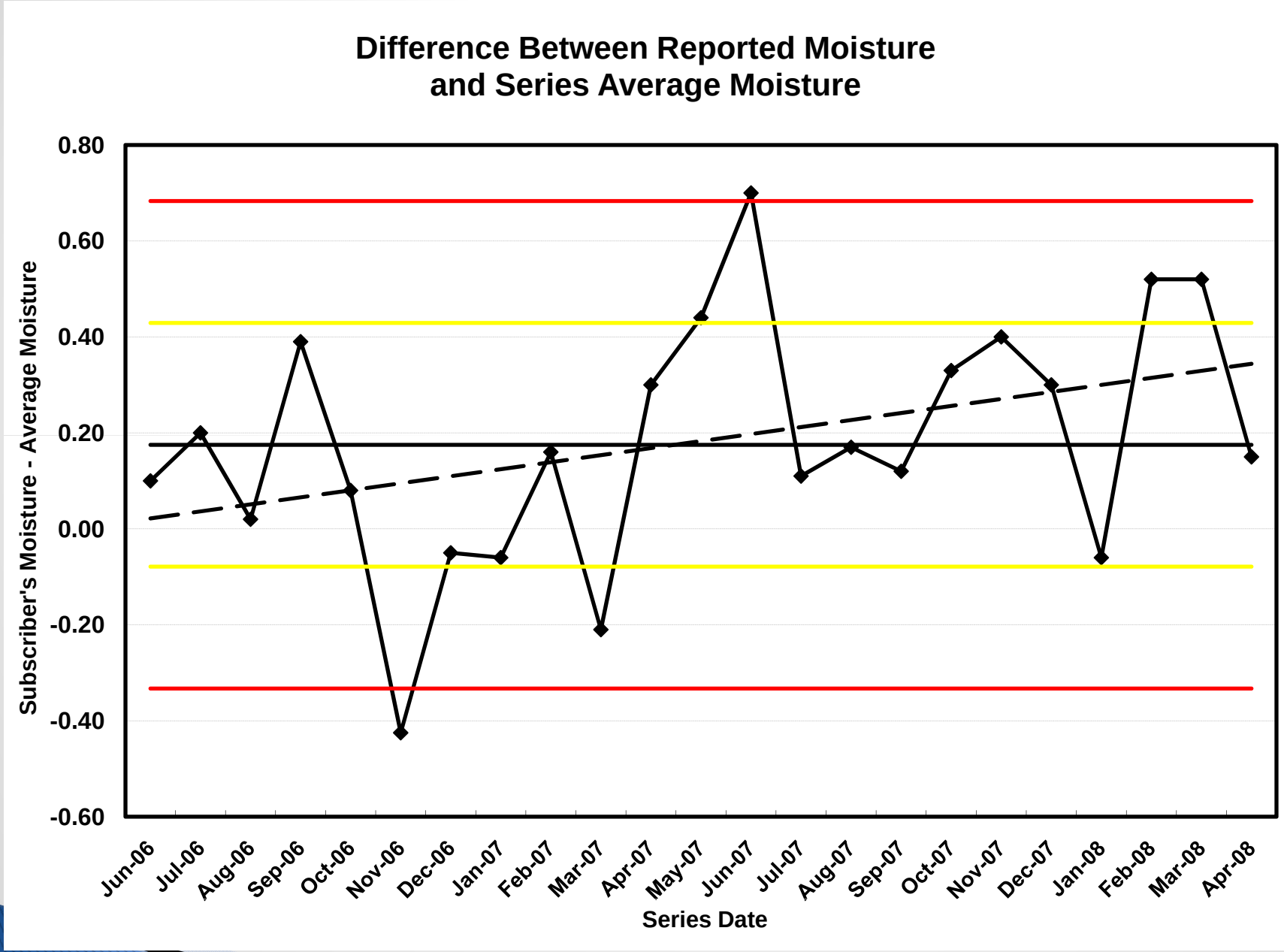
pH and Falling Number



% of Subcribers with Significant Biases or Trends

	Moisture	Protein	Ash	pH	FallNo
Biased	28	33	35	32	36
Slope	14	11	12	15	20

Data is for the last 2 years for 36 subscribers
Significant is $p<.05$


Difference Between Reported Moisture
and Series Average Moisture
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
Subscriber's Moisture - Average Moisture
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
Series Date

Conclusions

- Some accepted methods can have biases
  - Mistakes happen
- Results can change over time
  - Equipment wears, reagents age
- AACCI Check Sample Service provides an excellent quality tool