The USDA/GIPSA Proficiency Program: A Summary of Participants Capabilities for Detecting and Quantifying Transgenic Events in Corn and Soybeans

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Technical Services Division

Biotech Plants on the Market

- **Agronomic Traits**
  - **Herbicide resistance**
    - ***Roundup Ready*** **soybeans, corn, canola**
    - ***Liberty Link*** **corn, canola**
  - **Insect resistance**
    - ***Yield-Gard*** **(Bt) corn**
  - **Virus resistance**
    - ***Freedom II*** **squash**

Legislative Mandates and Benefit vs. Risk of Biotechnology Derived Events

- **United States**

  Substantial Equivalence

  -Toxicity

  -Nutritional Content

  -Allergenicity

- **Europe**

  Consumer Choice (Perceived Risk)

  -Labeling required if threshold above 0.9%

Grain Market Needs

- To distinguish biotech from conventional crops, the market needs testing techniques that are:
  - accurate
  - reliable
  - cost-effective
  - market compatible
- Testing will be combined synergistically with efficient and reliable IP (Identity Preservation) systems

DNA-Based Testing Issues: Quantitation

35S and NOS

- Multiple copies
- Units: % weight, % DNA material
- No recognized reference materials (ie. Herculex)

Event Specific

- Multiple copies
- Units: % weight, % DNA material
- Cannot distinguish between single events and stacked events
- Technology limitations (PCR)

GIPSA/FGIS' Mission

"Facilitate the marketing of U.S. grain for the benefit of American agriculture."

GIPSA Proficiency Program

Voluntary: National and International
Participation from 119 organizations

Bi-Annual dissemination of samples

- **First: February 2002**
- **Next: October 2005**

6 corn and 3 soybean samples
- **Two new events included (Herculex, Mon 863)**
- **Qualitative or Quantitative**
- **0 to 5.0 % (corn) or 0 to 3.0 % (Soy)**

Results posted on GIPSA web page

GIPSA Proficiency Program Results
April 2005

Organization Capabilities Varied

60 Organizations Participated

-25 Provided Qualitative Only Results

7 reported results for all events

(3 were 100% correct)

-12 Quantitative Only Results

4 reported results for all events

(2 provided acceptable z-scores for all events)

-23 Both Qualitative and Quantitative

8 reported results for all events

***Participants used a combination of DNA and protein based tests**

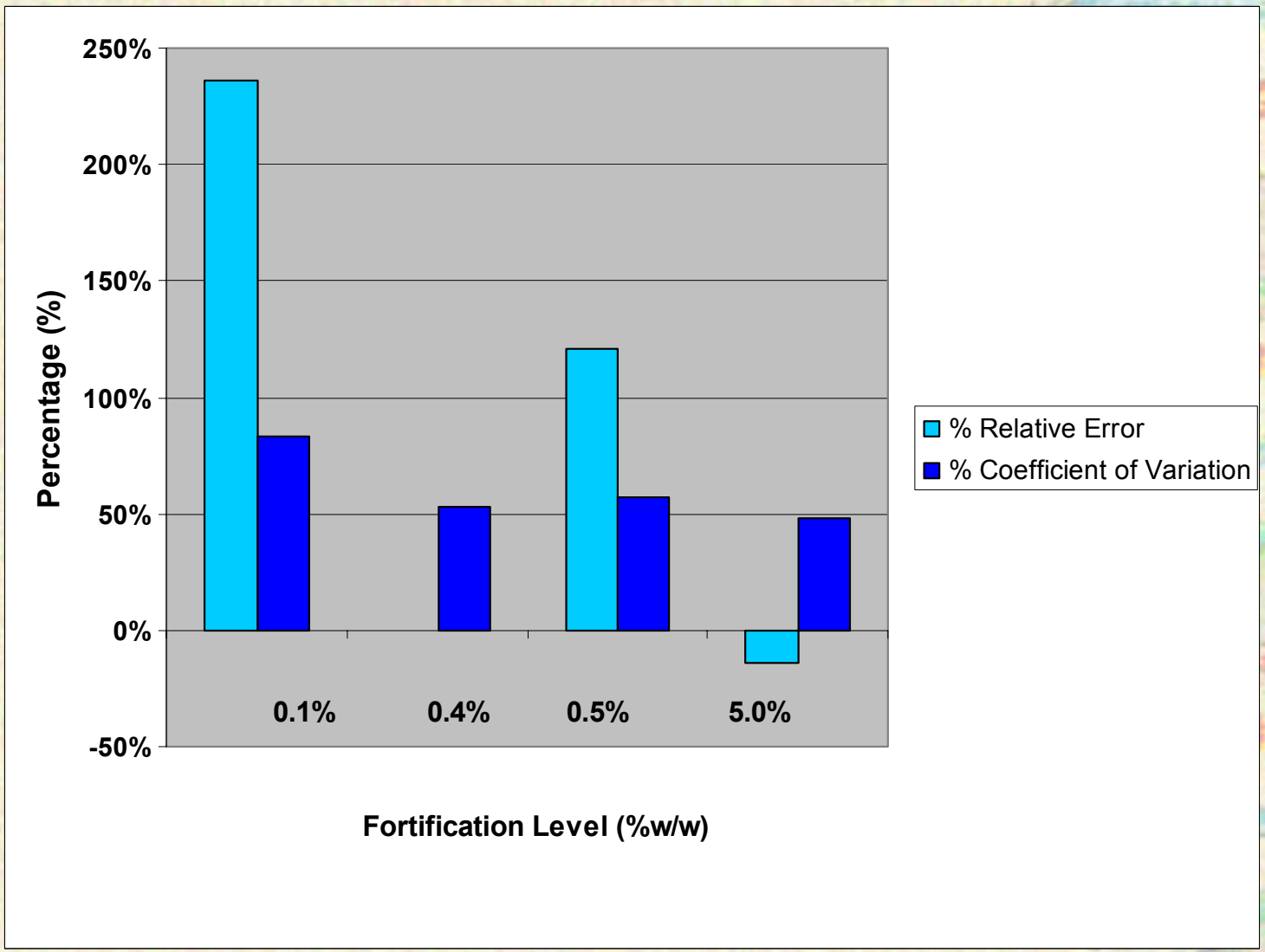
Data Analysis Event T-25 (Liberty Link)

Individual Reported Values						Z-Scores			
Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.0%	0.1%	0.5%	0.4%	5.0%	0.1%	0.5%	0.4%	5.0%
0.0	0.0	0.1	0.6	0.6	6.9	0.00	0.38	0.40	0.92
0.0	0.0	0.6	0.6	2.1	4.8	1.79	0.38	3.36	-0.10
0.0	0.0	1.1	0.5	1.5	5.7	3.58	0.00	2.18	0.34
0.0	0.0	0.5	0.3	0.6	3.4	1.43	-0.76	0.40	-0.78
0.0	0.0	0.1	0.1	0.8	1.5	0.00	-1.51	0.79	-1.70
0.0	0.00	0.10	0.40	0.40	4.92	0.00	-0.38	0.00	-0.04
0.0	0.0	0.4	0.8	0.7	3.7	1.08	1.14	0.59	-0.63
0.0	0.0	0.3	0.1	1.0	5.0	0.72	-1.51	1.19	0.00
	0.00	0.30	0.30	0.60		0.72	-0.76	0.40	
0.0	0.00	0.64	0.44	1.20	5.84	1.94	-0.23	1.58	0.41
0.0	0.0	0.1	0.4	0.2	3.0	0.00	-0.38	-0.40	-0.97
0.0	0.0	0.0	0.4	0.4	0.4	-0.36	-0.38	0.00	-2.24
0.0	0.0	0.3	0.5	1.2	1.5	0.72	0.00	1.58	-1.70
0.0	0.00	0.15	0.60	0.40	5.00	0.18	0.38	0.00	0.00
0.0	0.85	0.4	0.8	1.0	4.9	1.18	1.17	1.23	-0.07
0.0	0.0	0.25	1.13	1.42	7.82	0.54	2.39	2.02	1.37

Statistical Analysis T-25 (Liberty Link)

n	15	16	16	16	16	15
Actual	0.00	0.00	0.10	0.50	0.40	5.00
Mean	0.00	0.05	0.34	0.50	0.88	4.29
STD	0.00	0.21	0.28	0.26	0.51	2.06
CV	NA	4.00	0.83	0.53	0.57	0.48
RSD	NA	400%	83%	53%	57%	48%
% Relative Error	NA	NA	236%	0%	121%	-14%
Range						
Min	0.00	0.00	0.00	0.10	0.20	0.40
Max	0.00	0.85	1.10	1.13	2.10	7.82

T-25 (Liberty Link)



Data Analysis Event Mon810

Individual Reported Values

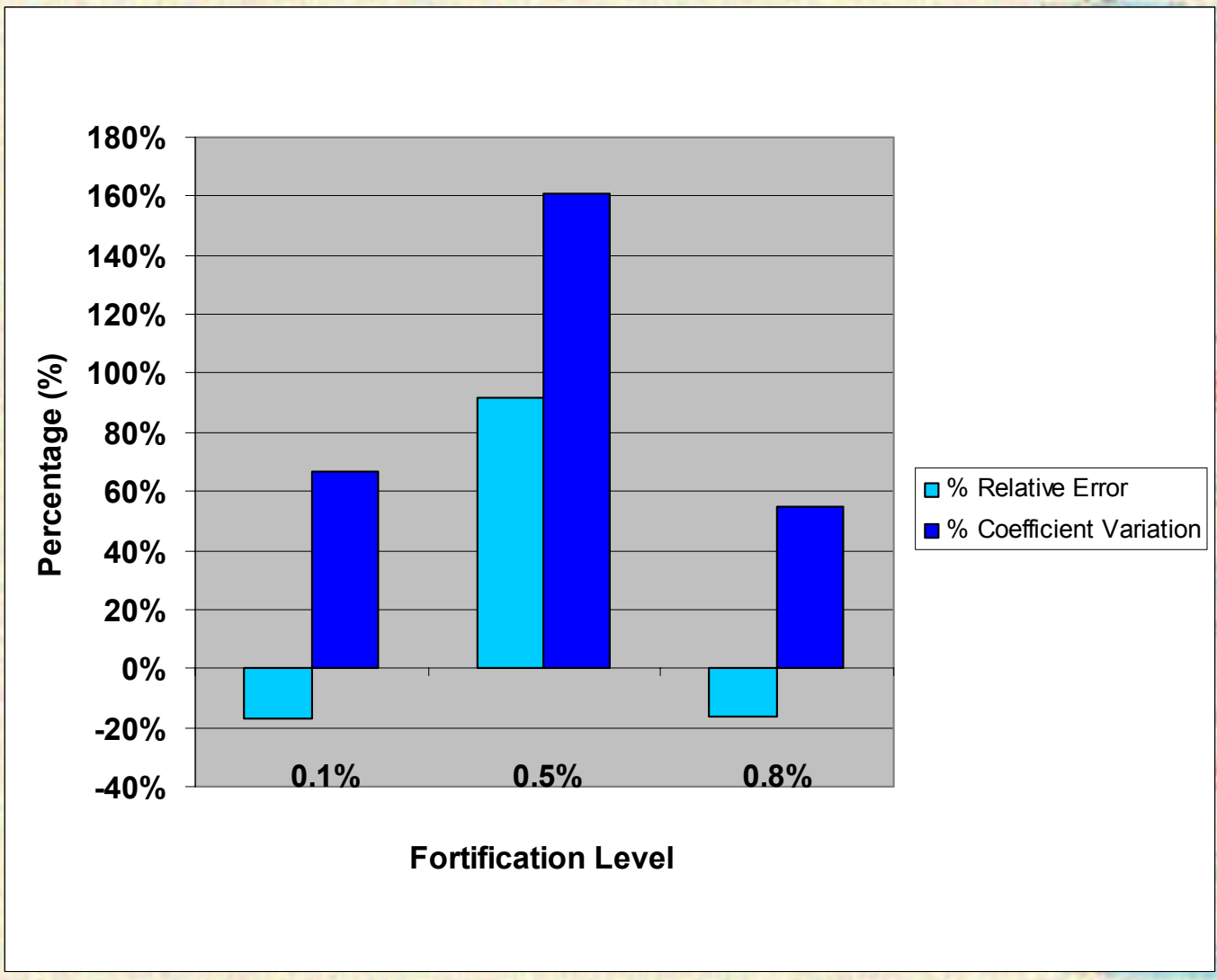
Z-Scores

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 2	Sample 5	Sample 6
0.0%	0.1%	0.0%	0.0%	0.8%	0.5%	0.1%	0.8%	0.5%
0.0	0.1	0.0	0.0	0.6	0.2	0.00	-0.54	-0.19
0.0	0.2	0.0	0.0	1.6	4.8	1.80	2.14	2.77
0.0	0.1	0.0	0.0	0.6	0.3	0.00	-0.54	-0.13
0.0	0.0	0.0	0.0	0.28	0.31	-1.80	-1.39	-0.12
0.0	0.1	0.0	0.0	0.8	0.3	0.00	0.00	-0.13
0.0	0.1	0.0	0.0	0.8	0.8	0.00	0.00	0.19
0.0	0.10	0.00	0.00	0.80	0.40	0.00	0.00	-0.06
0.0	0.1	0.0	0.0	0.4	0.3	0.00	-1.07	-0.13
0.0	0.00	0.00	0.0	0.40	0.27	-1.80	-1.07	-0.15
0.0	0.1	0.0	0.0	0.7	0.3	0.00	-0.27	-0.13
0.0	0.1	0.0	0.0	0.5	0.3	0.00	-0.80	-0.13
	0.00	0.00	0.00	0.40		-1.80	-1.07	
0.0	0.1	0.0	0.0	0.5	0.5	0.00	-0.80	0.00
0.0	0.0	0.0	0.0	0.9	0.4	-1.80	0.27	-0.06
0.0	0.06	0.00	0.00	0.82	0.26	-0.72	0.05	-0.15
0.0	0.1	0.0	0.0	1.2	0.8	0.00	1.07	0.19
0.0	0.2	0.0	0.8	0.0	0.2	1.80	-2.14	-0.19
0.0	0.1	0.0	0.0	0.9	0.3	0.00	0.27	-0.13
0.0	0.09	0.11	0.26	0.35	0.90	-0.18	-1.20	0.26
0.0	0.0	0.19	1.05	1.38	5.80	-1.80	1.55	3.42
0.0	0.1	0.0	0.0	0.9	3.2	0.18	0.24	1.76
0.0	0.05	0.00	0.00	0.31	0.15	-0.90	-1.31	-0.23
0.0	0.10		0.0	0.4	0.30	0.00	-1.07	-0.13

Statistical Analysis Mon810

n	22	23	22	23	23	22
Actual	0.0	0.1	0.0	0.0	0.8	0.5
Mean	0.00	0.08	0.01	0.09	0.68	0.96
STD	0.00	0.06	0.05	0.27	0.37	1.55
CV	NA	0.67	3.36	2.95	0.55	1.61
RSD	NA	67%	336%	295%	55%	161%
% Relative Error	NA	-17%	NA	NA	-16%	92%
Range						
Min	0.00	0.00	0.00	0.00	0.00	0.15
Max	0.00	0.20	0.19	1.05	1.60	5.80

Mon810


180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
-20%
-40%
Percentage (%)
0.1%
0.5%
0.8%
Fortification Level
% Relative Error
% Coefficient Variation

Data Analysis CBH 351

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.1%	0.1%	0.1%	0.4%	1.5%
0.0	0.1	0.1	0.1	0.4	1.5
0.0	0.0	0.1	0.1	0.2	0.8
0.0	0.3	0.8	0.5	0.5	1.6
0.0	0.3	0.6	0.2	1.1	
0.0	0.1	0.3	0.1	0.5	1.5
0.0	0.06	0.12	0.00	0.28	1.34
0.0	0.1	0.1	0.1	0.2	1.5
0.2	0.1	0.0	0.0	0.1	0.4
0.0	0.07	0.07	0.20	0.40	2.40
0.0	0.03	0.05	0.10	0.32	1.12

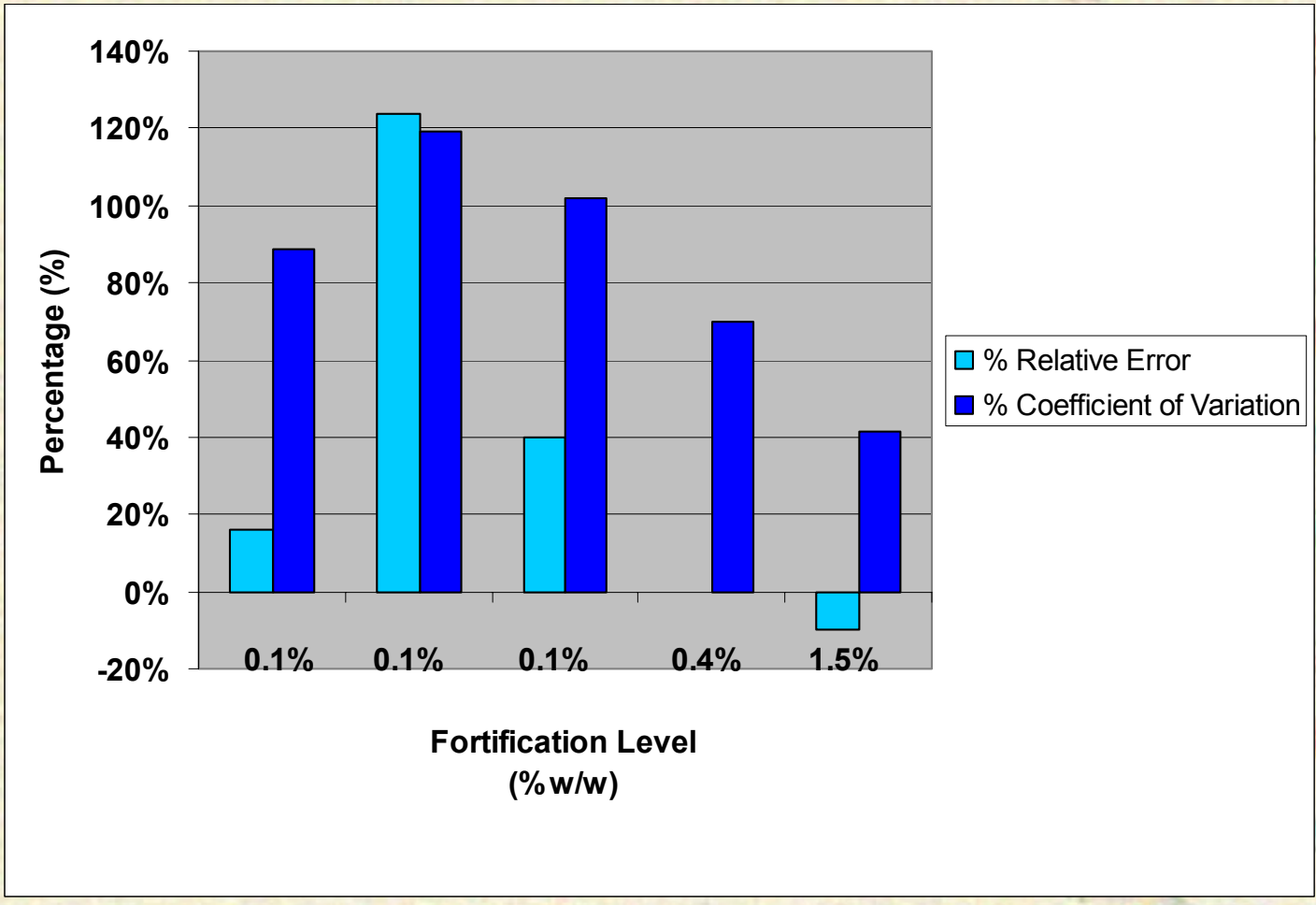
Z-Scores

Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.1%	0.1%	0.1%	0.4%	1.5%
0.00	0.00	0.00	0.00	0.00
-0.97	0.00	0.00	-0.72	-1.25
1.95	2.62	2.80	0.36	0.18
1.95	1.87	0.70	2.51	
0.00	0.75	0.00	0.36	0.00
-0.39	0.07	-0.70	-0.43	-0.29
0.00	0.00	0.00	-0.72	0.00
0.00	-0.37	-0.70	-1.08	-1.97
-0.29	-0.11	0.70	0.00	1.61
-0.68	-0.19	0.00	-0.29	-0.68

Statistical Analysis CBH351

n	10	10	10	10	10	9
Actual	0.0	0.1	0.1	0.1	0.4	1.5
Mean	0.02	0.12	0.22	0.14	0.40	1.35
STD	0.06	0.10	0.27	0.14	0.28	0.56
CV	3.16	0.88	1.19	1.02	0.70	0.41
RSD	316%	88%	119%	102%	70%	41%
% Relative Error	NA	16%	124%	40%	0%	-10%
Range						
Min	0.00	0.00	0.00	0.00	0.10	0.40
Max	0.20	0.30	0.80	0.50	1.10	2.40

Graph CBH 351



Data Analysis GA21

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.1%	0.1%	3.0%	0.4%	0.1%
0.0	0.2	0.2	3.3	0.5	0.1
0.0	0.1	0.1	2.7	0.3	0.1
0.0	0.1	0.1	2.2	0.3	0.1
0.0	0.1	0.1	1.7	0.4	0.1
0.0	0.1	0.1	3.0	0.4	0.1
0.0	0.1	0.1	1.8	0.3	0.1
0.0	0.10	0.10	2.16	0.39	0.10
0.0	0.0	0.0	2.8	0.4	0.1
0.0	0.3	0.2	3.0	0.5	0.1
0.0	0.1	0.2	4.1	0.1	0.15
	0.0	0.0	2.0	0.38	
0.0	0.0	0.0	1.9	0.2	0.0
0.0	0.12	0.20	2.32	0.50	0.12
0.0	0.1	0.1	2.0	0.4	0.1
0.4	0.0	0.2	0.4	0.4	0.8
0.0	0.0	0.0	2.0	0.4	0.4
0.0	0.10	0.10	0.60	0.40	0.04
0.0	0.2	0.14	8.50	0.95	0.14
0.0	0.06	0.09	2.23	0.72	0.07
0.0	0.03		0.8	0.1	0.02

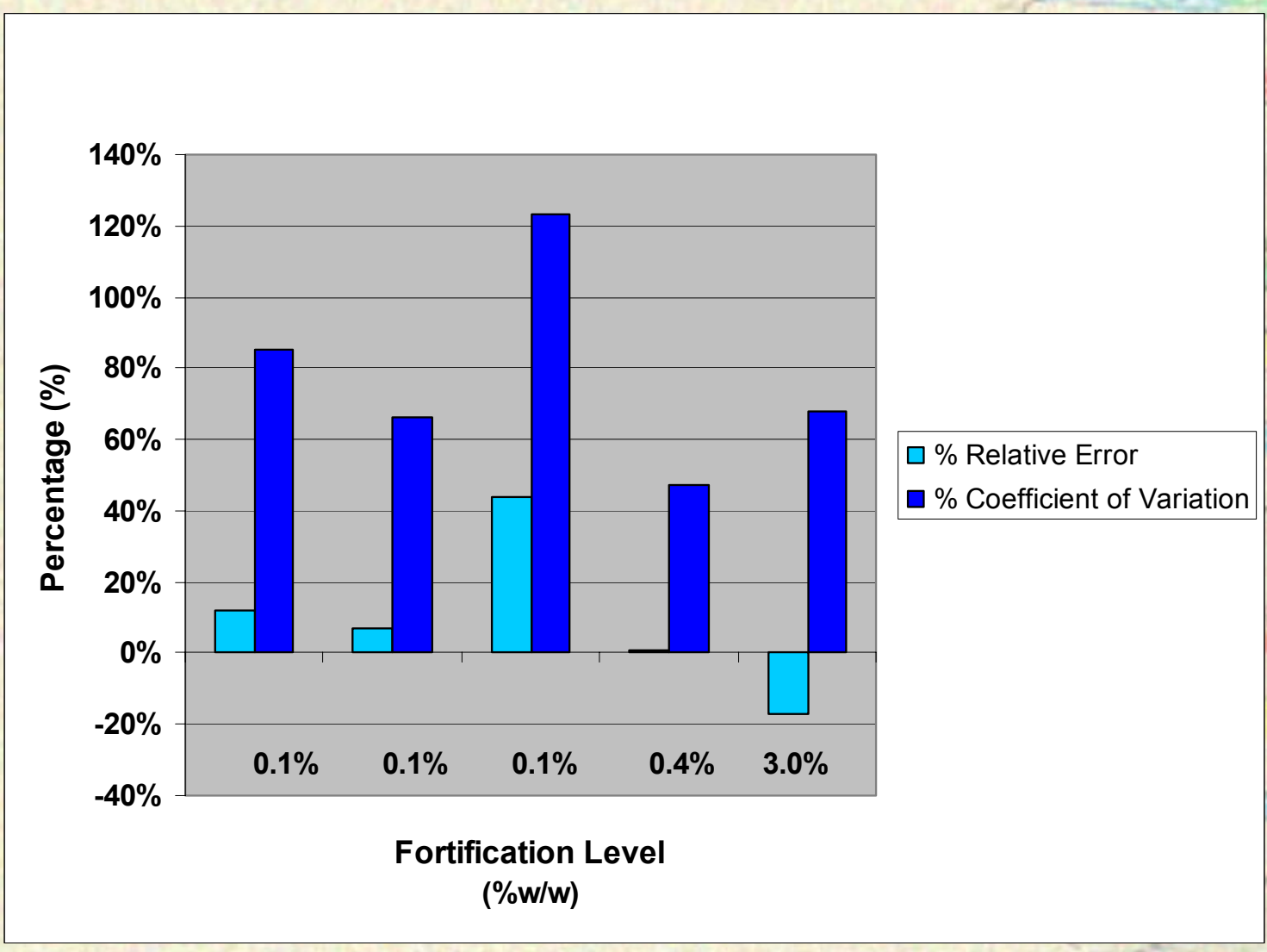
Z-Scores

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0	0.1%	0.1%	3.0%	0.4%	0.1%
0.00	1.34	1.41	0.18	0.53	0.00
0.00	0.00	0.00	-0.18	-0.53	0.00
0.00	0.00	0.00	-0.48	-0.53	0.00
0.00	0.00	0.00	-0.78	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	-0.72	-0.53	0.00
0.00	0.00	0.00	-0.50	-0.05	0.00
0.00	-1.34	-1.41	-0.12	0.00	0.00
0.00	2.67	1.41	0.00	0.53	0.00
0.00	0.00	1.41	0.66	-1.58	0.28
	-1.34	-1.41	-0.60	-0.11	
0.00	-1.34	-1.41	-0.66	-1.05	-0.56
0.00	0.27	1.41	-0.41	0.53	0.11
0.00	0.00	0.00	-0.60	0.00	0.00
4.36	-1.34	1.41	-1.55	0.00	3.94
0.00	-1.34	-1.41	-0.60	0.00	1.69
0.00	0.00	0.00	-1.43	0.00	-0.34
0.00	0.67	0.56	3.28	2.90	0.23
0.00	-0.53	-0.14	-0.46	1.68	-0.17
0.00	-0.93		-1.31	-1.58	-0.45

Statistical Analysis GA21

n	19	20	19	20	20	19
Actual	0.0	0.1	0.1	3.0	0.4	0.1
Mean	0.02	0.09	0.11	2.48	0.40	0.14
STD	0.09	0.07	0.07	1.67	0.19	0.18
CV	4.36	0.85	0.66	0.68	0.47	1.23
RSD	436%	85%	66%	68%	47%	123%
% Relative Error	NA	12%	7%	-17%	1%	44%
Range						
Min	0.00	0.00	0.00	0.40	0.10	0.00
Max	0.40	0.30	0.20	8.50	0.95	0.80

Graph GA21


140%
120%
100%
80%
60%
40%
20%
0%
-20%
-40%
Percentage (%)
0.1%
0.1%
0.1%
0.4%
3.0%
Fortification Level
(%w/w)
% Relative Error
% Coefficient of Variation

Data Analysis Bt-176

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.1%	0.0%	1.5%	0.4%	0.0%
0.0	0.1	0.0	0.8	0.3	0.0
0.0	0.1	0.0	1.0	0.3	0.0
0.0	0.1	0.0	1.1	0.4	0.0
0.0	0.1	0.0	1.0	0.4	0.0
0.0	0.1	0.0	0.8	0.4	0.0
0.0	0.11	0.00	0.86	0.35	0.00
0.0	0.0	0.0	1.8	0.6	0.0
0.0	0.11	0.00	1.7	0.25	0.00
0.0	0.1	0.1	0.7	0.3	0.0
0.0	0.1	0.0	1.4	0.8	0.0
	0.10	0.00	1.40	0.40	
0.0	0.5	0.0	1.6	1.2	0.0
0.0	0.0	0.0	0.5	0.2	0.0
0.0	0.22	0.00	2.34	0.68	0.00
0.0	0.2	0.0	1.5	0.4	0.0
0.4	0.2	0.0	0.4	0.4	0.4
0.0	2.9	0.0	1.0	1.0	0.0
0.0	0.07	0.00	1.20	0.40	0.00
0.0	0.0	0.00	1.00	0.23	0.00
0.0	0.1	0.0	0.5	0.2	
0.0	0.13	0.00	0.95	0.23	0.00
0.0	0.08		1.0	0.3	0.00

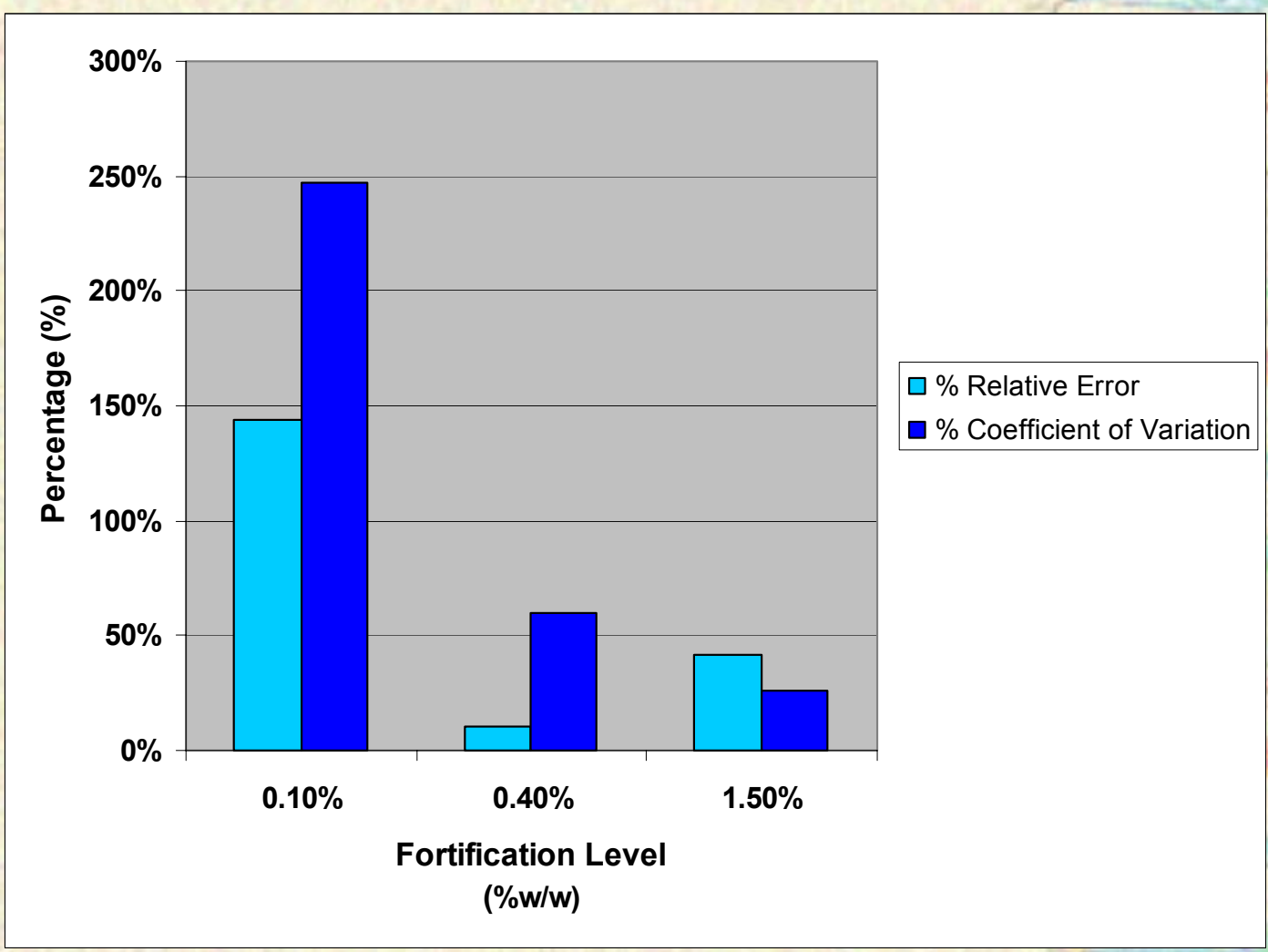
Z-Scores

Sample 2	Sample 4	Sample 5
0.1%	1.5%	0.4%
0.00	-1.49	-0.38
0.00	-1.07	-0.38
0.00	-0.85	0.00
0.00	-1.07	0.00
0.00	-1.49	0.00
0.02	-1.36	-0.19
-0.17	0.64	0.76
0.02	0.43	-0.57
0.00	-1.70	-0.38
0.00	-0.21	1.52
0.00	-0.21	0.00
0.66	0.21	3.03
-0.17	-2.13	-0.76
0.20	1.79	1.06
0.17	0.00	0.00
0.17	-2.34	0.00
4.65	-1.07	2.27
-0.05	-0.64	0.00
-0.17	-1.07	-0.64
-0.08	-2.07	-0.91
0.05	-1.17	-0.64
-0.03	-1.07	-0.38

Statistical Analysis Bt 176

n	21	22	21	22	22	20
Actual	0.0	0.1	0.0	1.5	0.4	0.0
Mean	0.02	0.24	0.00	1.12	0.44	0.02
STD	0.09	0.60	0.02	0.47	0.26	0.09
CV	4.58	2.47	4.58	0.42	0.60	4.47
RSD	458%	247%	458%	42%	60%	447%
% Relative Error	NA	144%	NA	26%	10%	NA
Range						
Min	0.00	0.00	0.00	0.40	0.16	0.00
Max	0.40	2.90	0.10	2.34	1.20	0.40

Graph Bt 176


300%
250%
200%
150%
100%
50%
0%
Percentage (%)
0.10%
0.40%
1.50%
Fortification Level
(%w/w)
% Relative Error
% Coefficient of Variation

Data Analysis NK603

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.1%	0.4%	1.5%	0.8%	5.0%
0.0	0.1	0.3	0.8	0.7	3.4
0.0	0.1	0.7	1.1	0.9	4.7
0.0	0.1	0.7	0.8	0.6	4.1
0.0	0.11	0.63	1.04	0.84	5.28
0.0	0.0	0.2	0.8	0.5	3.0
0.0	0.1	0.0	2.0	0.6	4.0
0.0	0.1	0.5	1.2	0.8	4.4
	0.10	0.36	1.10	0.80	
0.0	0.10	0.64	1.18	1.24	6.02
0.0	1.0	0.4	1.0	0.8	3.0
0.4	0.0	0.2	0.4	0.4	0.8
0.0	0.0	0.5	1.3	1.4	4.0
0.0	0.06	0.30	0.50	0.40	1.00
0.0	0.34	2.11	7.90	5.33	39.00
0.0	0.1	0.4	1.1	0.8	5.8
0.0	0.10		1.1	0.9	5.00

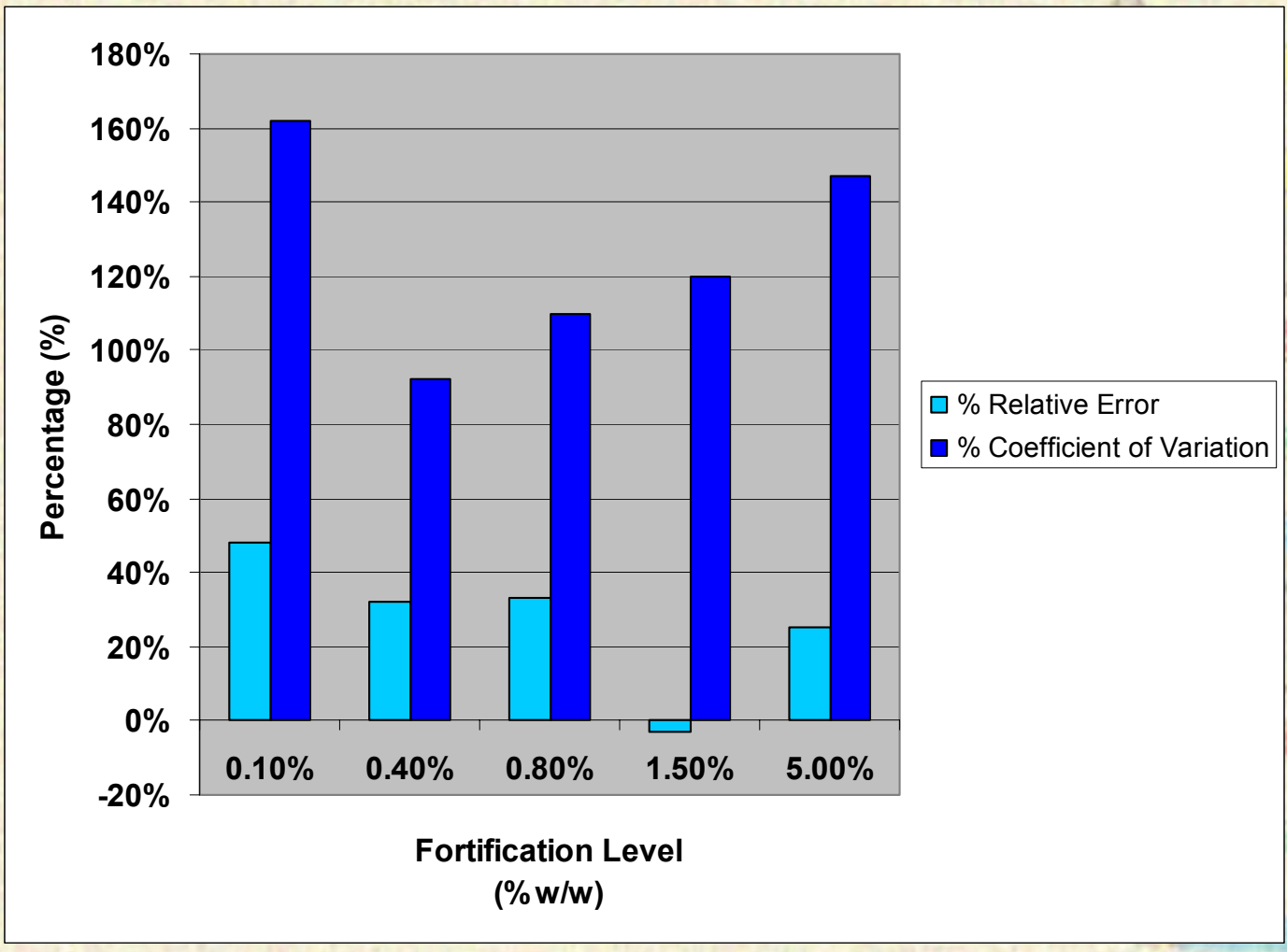
Z-Scores

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0	0.1%	0.4%	1.5%	0.8%	5.0%
0.00	0.00	-0.21	-0.40	-0.09	-0.17
0.00	0.00	0.62	-0.23	0.09	-0.03
0.00	0.00	0.62	-0.40	-0.17	-0.10
0.00	0.04	0.48	-0.26	0.03	0.03
0.00	-0.42	-0.41	-0.40	-0.26	-0.22
0.00	0.00	-0.83	0.28	-0.17	-0.11
0.00	0.00	0.21	-0.17	0.00	-0.07
	0.00	-0.08	-0.23	0.00	
0.00	0.00	0.50	-0.18	0.38	0.11
0.00	3.75	0.00	-0.28	0.00	-0.22
3.87	-0.42	-0.41	-0.63	-0.34	-0.46
0.00	-0.42	0.21	-0.11	0.51	-0.11
0.00	-0.17	-0.21	-0.57	-0.34	-0.44
0.00	1.00	3.55	3.65	3.88	3.70
0.00	-0.17	-0.08	-0.23	0.01	0.09
0.00	0.00		-0.23	0.09	0.00

Statistical Analysis NK603

n	15	16	16	15	16	15
Actual	0.0	0.1	0.4	1.5	0.8	5.0
Mean	.03	0.15	0.53	1.46	1.06	6.23
STD	1.00	0.24	0.48	1.76	1.17	9.19
CV	3.81	1.62	0.92	1.21	1.10	1.47
RSD	381%	162%	92%	121%	110%	147%
% Relative Error	NA	50%	33%	-3%	33%	25%
Range						
Min	0.00	0.00	0.00	0.40	0.40	0.80
Max	0.40	1.00	2.11	7.90	5.33	39.00

Graph NK603


180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
-20%
Percentage (%)
0.10%
0.40%
0.80%
1.50%
5.00%
Fortification Level
(% w/w)
% Relative Error
% Coefficient of Variation

Data Analysis Herculex (TC1507)

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.0%	0.4%	0.0%	0.8%	0.0%
0.0	0.0	0.3	0.0	0.6	0.0
0.0	0.0	0.3	0.0	0.7	0.0
0.0	0.00	0.42	0.00	0.75	0.00
0.0	0.0	0.1	0.0	0.3	0.0
0.0	0.0	0.1	0.0	0.2	0.0
0.0	0.0	0.5	0.0	0.8	0.0
0.0	0.0	0.4	0.0	0.8	0.0
0.8	0.0	0.0	0.2	0.4	0.0
0.0	0.0	0.2	0.0	0.5	0.0
0.0	0.00	0.27	0.00	0.45	0.00
0.0	0.00	0.37	0.00	0.65	0.00

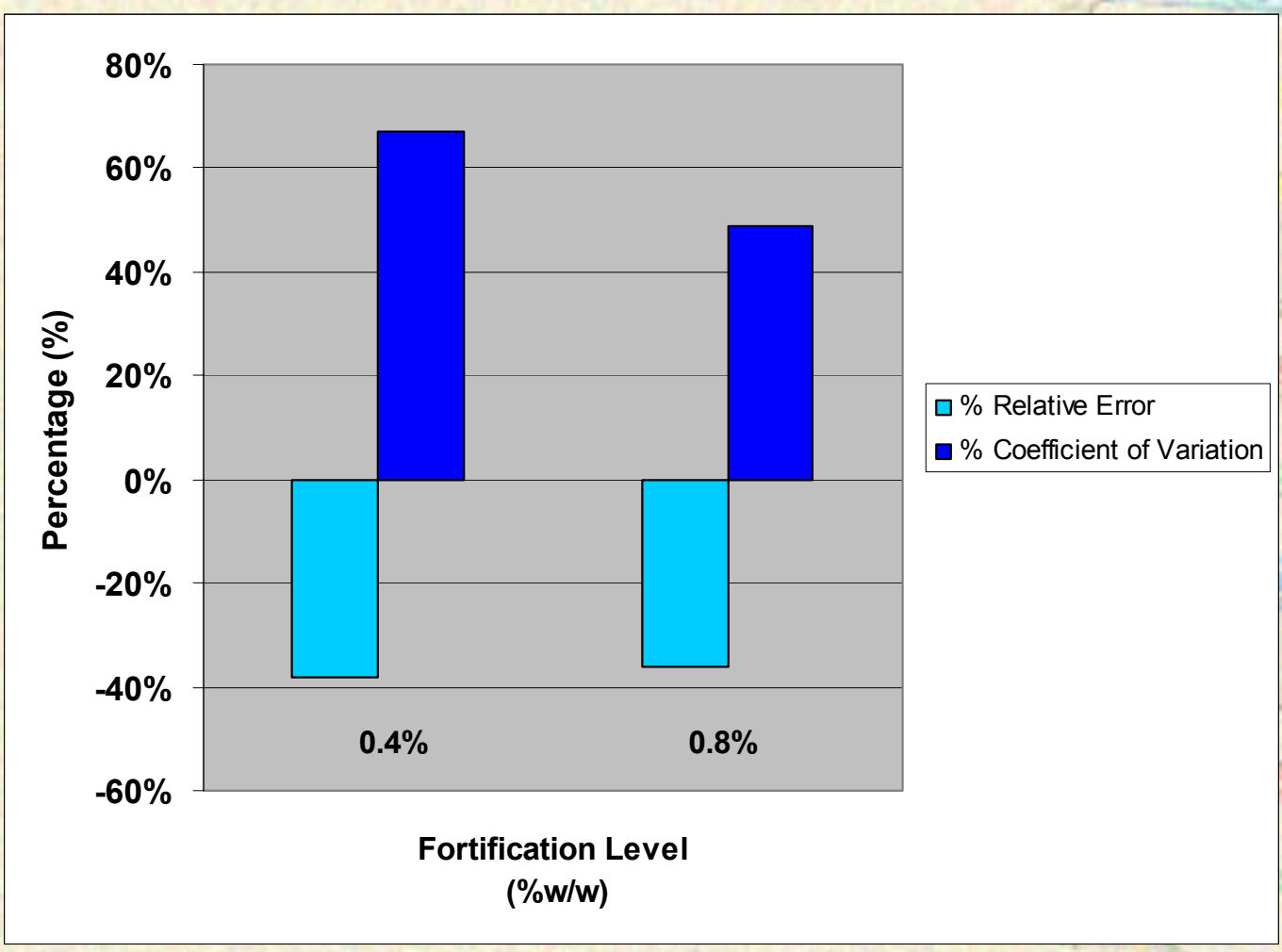
Z-Scores

Sample 1	Sample 3	Sample 4	Sample 5
0.0	0.4%	0.0%	0.8%
0.00	-0.60	0.00	-0.79
0.00	-0.60	0.00	-0.40
0.00	0.12	0.00	-0.20
0.00	-1.80	0.00	-1.99
0.00	-1.80	0.00	-2.38
0.00	0.60	0.00	0.00
0.00	0.00	0.00	0.00
3.46	-2.41	3.46	-1.59
0.00	-1.20	0.00	-1.19
0.00	-0.78	0.00	-1.39
0.00	-0.18	0.00	-0.60

Statistical Analysis Herculex (TC1507)

n	12	12	12	12	12	12
Actual	0.0	0.0	0.4	0.0	0.8	0.0
Mean	0.07	0.00	0.25	0.02	0.51	0.00
STD	0.23	0.00	0.17	0.06	0.25	0.00
CV	3.46	NA	0.68	3.46	0.49	NA
RSD	346%	NA	68%	346%	49%	NA
% Relative Error	NA	NA	-38%	NA	-36%	NA
Range						
Min	0.00	-2.38	0.00	0.00	0.00	0.00
Max	3.46	0.00	0.00	0.00	0.00	0.00

Graph Herculex (TC1507)



Data Analysis Bt-11

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0	0.1%	0.1%	3.0%	0.4%	0.0%
0.0	0.1	0.1	2.4	0.4	0.0
0.0	0.1	0.2	3.3	0.4	0.0
0.0	0.2	0.3	2.9	0.6	0.0
0.0	0.1	0.2	3.5	0.6	0.0
0.0	0.1	0.1	1.5	0.5	0.0
0.0	0.10	0.14	2.90	0.48	0.00
0.0	0.0	0.0	2.2	0.4	0.0
0.0	0.13	0.13	3.9	0.61	0.00
0.0	0.2	0.1	2.0	0.3	0.0
0.0	0.1	0.1	2.7	0.4	0.0
	0.13	0.10	3.00	0.60	
0.0	0.22	0.16	3.00	0.60	0.00
0.0	0.3	0.2	2.0	0.4	0.0
0.4	0.2	0.0	0.4	0.4	0.4
0.0	0.1	0.0	2.0	0.6	0.0
0.0	0.10	0.10	1.80	0.15	0.00
0.0	0.09	0.08	2.29	0.24	0.00
0.0	0.1	0.1	2.9	0.3	

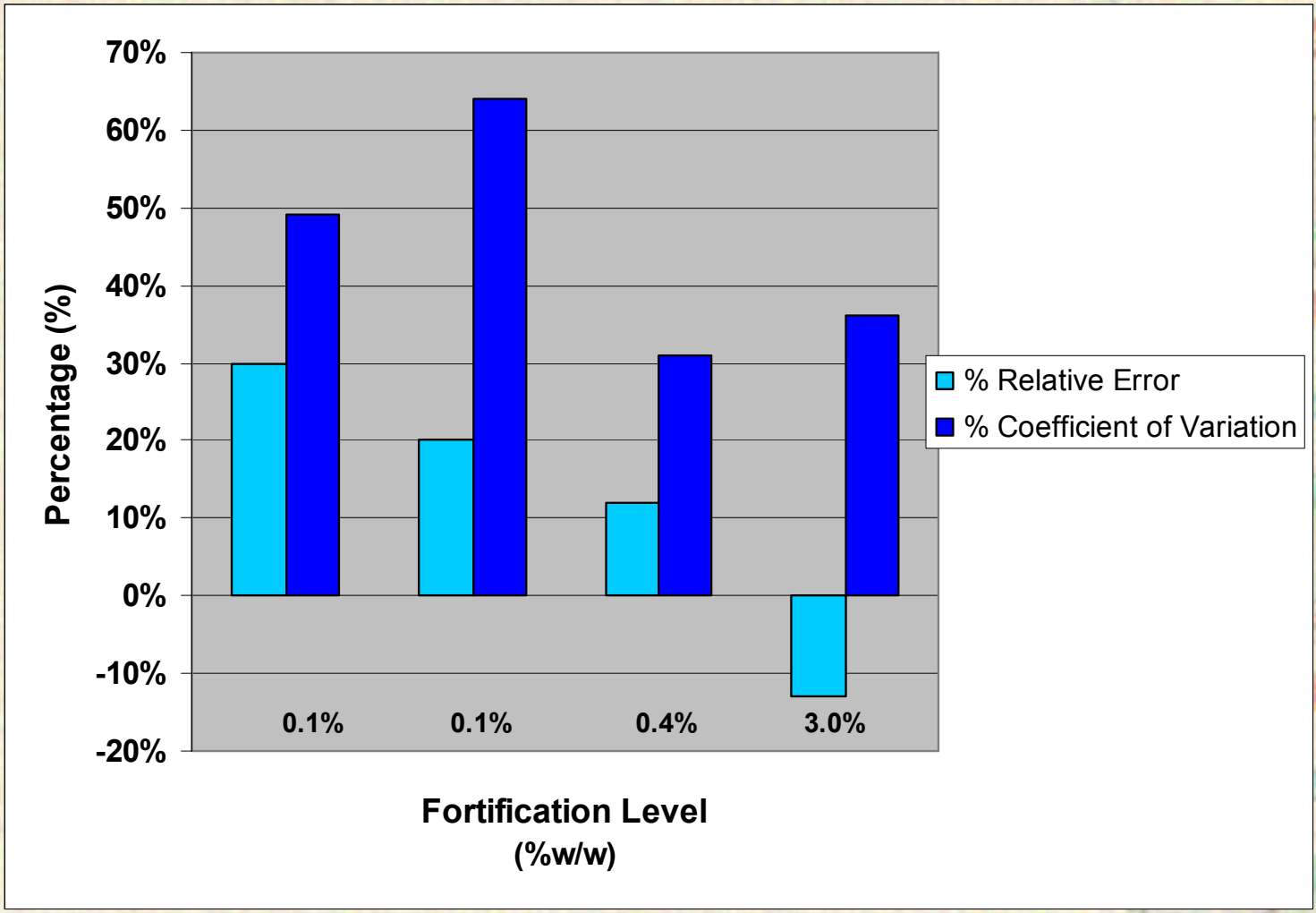
Z-Scores

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0	0.1%	0.1%	3.0%	0.4%	0.0%
0.00	0.00	0.00	-0.64	0.00	0.00
0.00	0.00	1.34	0.32	0.00	0.00
0.00	1.52	2.67	-0.11	1.44	0.00
0.00	0.00	1.34	0.53	1.44	0.00
0.00	0.00	0.00	-1.59	0.72	0.00
0.00	0.00	0.53	-0.11	0.58	0.00
0.00	-1.52	-1.34	-0.85	0.00	0.00
0.00	0.46	0.40	0.96	1.51	0.00
0.00	1.52	0.00	-1.06	-0.72	0.00
0.00	0.00	0.00	-0.32	0.00	0.00
0.00	0.46	0.00	0.00	1.44	0.00
0.00	1.83	0.80	0.00	1.44	0.00
0.00	3.05	1.34	-1.06	0.00	0.00
4.24	1.52	-1.34	-2.76	0.00	4.12
0.00	0.00	-1.34	-1.06	1.44	0.00
0.00	0.00	0.00	-1.27	-1.80	0.00
0.00	-0.15	-0.27	-0.75	-1.15	0.00
0.00	0.61	0.13	-0.06	-0.86	0.00

Statistical Analysis Bt-11

n	18	19	19	19	19	17
Actual	0.0	0.1	0.1	3.0	0.4	0.0
Mean	0.02	0.13	0.12	2.60	0.45	0.02
STD	0.09	0.07	0.07	0.94	0.14	0.10
CV	4.24	0.49	0.64	0.36	0.31	4.12
RSD	424%	49%	64%	36%	31%	412%
% Relative Error	NA	35%	17%	-13%	12%	NA
Range						
Min	0.00	0.00	0.00	0.40	0.15	0.00
Max	0.40	0.30	0.30	4.67	0.61	0.40

Graph Bt11


70%
60%
50%
40%
30%
20%
10%
0%
-10%
-20%
Percentage (%)
0.1%
0.1%
0.4%
3.0%
% Relative Error
% Coefficient of Variation
Fortification Level
(%w/w)

Data Analysis Mon863

Individual Reported Values

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
0.0%	0.1%	0.4%	0.0%	0.8%	0.0%
0.0	0.1	0.4	0.0	0.7	0.0
0.0	0.2	0.7	0.0	1.1	0.0
0.0	0.12	0.80	0.00	1.12	0.00
0.0	0.1	0.3	0.0	1.0	0.0
0.0	0.1	0.4	0.0	1.0	0.0
	0.00	0.24	0.00	0.50	
0.0	0.1	0.4	0.0	0.8	0.0
0.0	0.1	0.0	0.0	1.2	0.0
0.0	0.06	0.35	0.00	0.51	0.00
0.0	0.05	0.27	0.00	0.40	0.00
0.0	0.10		0.0	0.8	0.00

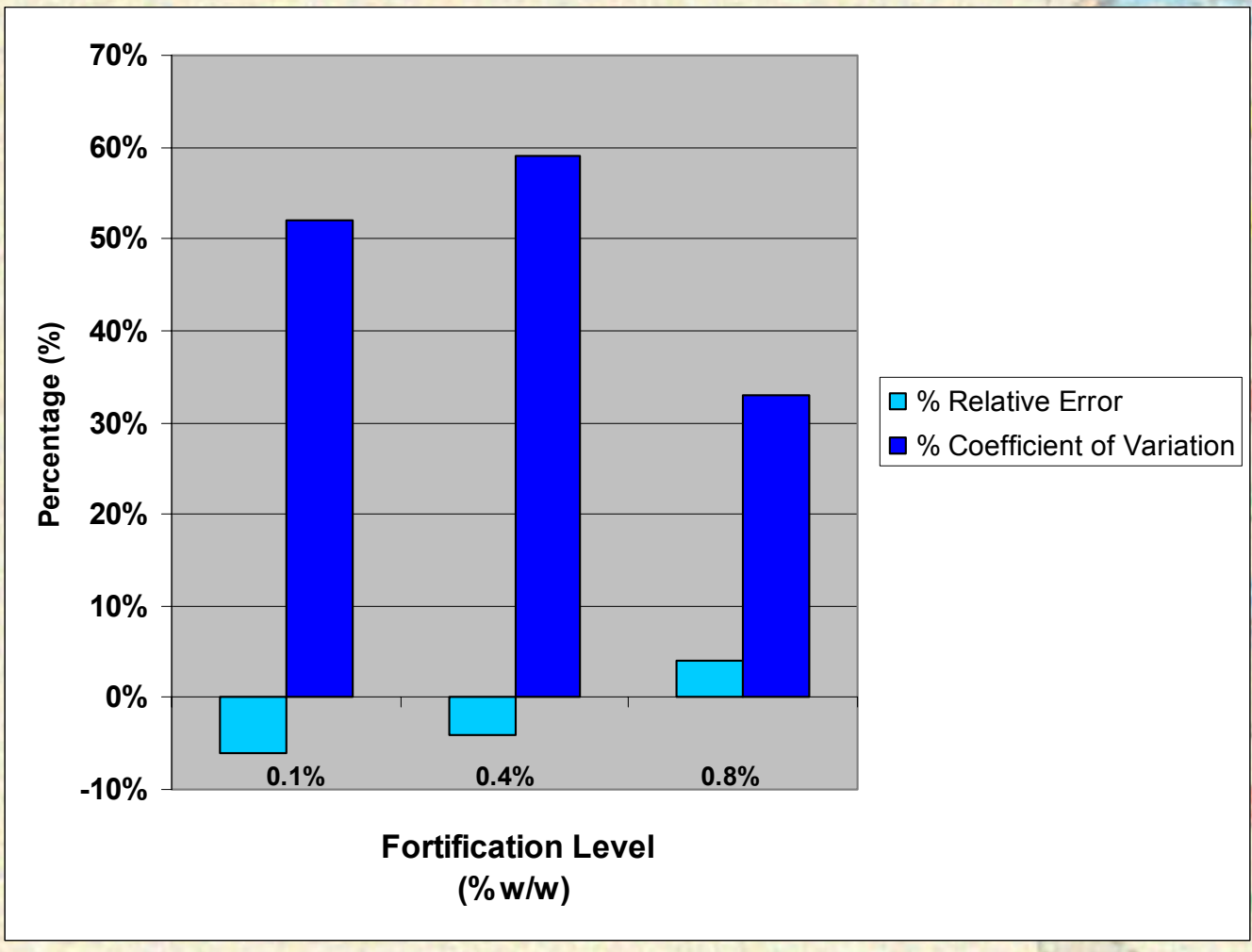
Z-Scores

Sample 2	Sample 3	Sample 5
0.1%	0.4%	0.8%
0.00	0.00	-0.36
2.04	1.32	1.08
0.41	1.76	1.16
0.00	-0.44	0.72
0.00	0.00	0.72
-2.04	-0.71	-1.08
0.00	0.00	0.00
0.00	-1.76	1.44
-0.82	-0.22	-1.05
-1.02	-0.57	-1.44
0.00		0.00

Statistical Analysis Mon863

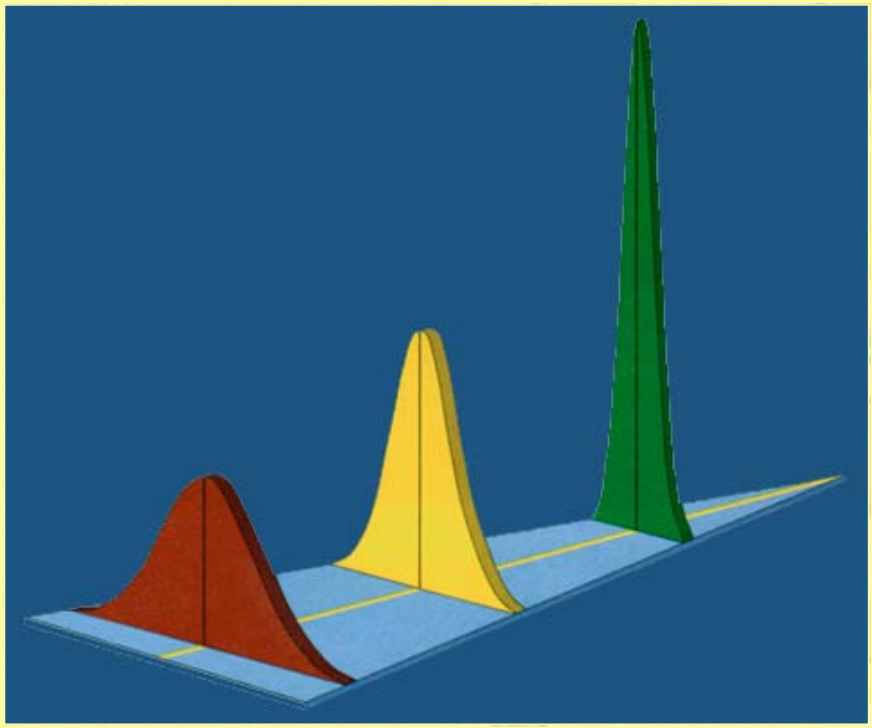
n	10	11	10	11	11	10
Actual	0	0.1	0.4	0	0.8	0
Mean	0	0.09	0.39	0	0.83	0
STD	0	0.05	0.23	0	0.28	0
CV	NA	0.52	0.59	NA	0.33	NA
RSD	NA	52%	59%	NA	33%	NA
% Relative Error	NA	-6%	-4%	NA	4%	NA
Range						
Min	0	0	0	0	0.4	0
Max	0	0.2	0.8	0	1.2	0

Graph Mon863



USDA's Role

USDA can facilitate the marketing of Biotech and non-Biotech grains by improving and standardizing the detection methods for Biotech grains.



GIPSA's Role

Is

- To facilitate the fair and orderly marketing of grain, whether biotech, traditional, or value-enhanced

Is Not

- To approve, release, or take a position on the advantages or disadvantages of biotech crops

www.usda.gov/gipsa/biotech/biotech.htm



Vielen Dank !

