

Overcoming Melamine Adulteration with Accurate Protein Testing

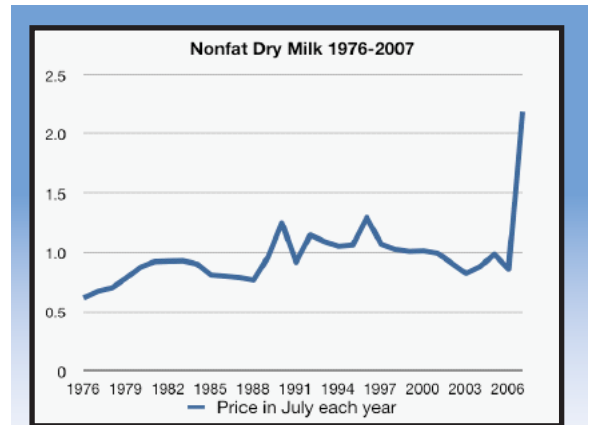
SPRINT
Rapid Protein Analyzer



CEM
Discovering The Future

The Problem with Total Nitrogen Determinations

In today's global marketplace, there has been increasing concern over the practice of spiking ingredients with melamine, a nitrogen-rich compound that crystallizes in the kidneys and can cause renal failure. Unscrupulous suppliers have salted ingredients, such as wheat gluten and milk, with melamine so their products will yield falsely high protein levels in traditional protein tests that use total nitrogen determinations (Kjeldahl and combustion methods).



From 2006 to 2007, non-fat dry milk prices rose 104%, overall food prices were up 4.5% and dairy and related products went up 13.1%.¹

Why add Melamine?

Why would someone put melamine in milk knowing that it could be harmful? Unfortunately, it is simply a matter of greed. The higher the protein content, the better the price that suppliers can demand for their products.

Protein costs are high. Naturally, food producers want to know the actual protein content of the ingredients they are buying, so that they know they are paying a fair price. For example, if milk protein costs approximately \$2.25 per pound and a tanker truck carries 50,000 pounds of milk.

- If the milk has 3.15% protein content, the value of the protein in the truck load of milk is \$3,543.
- If milk has 4.41% protein content, the value of the protein in the truck load of milk is **\$4,961!**

Just a 1.26% difference in protein content results in a 40% increase in the price of the milk protein!



How can SPRINT™ help ensure the quality of protein?

SPRINT removes the incentive to add melamine. SPRINT's proprietary iTAG™ technology binds to the protein itself and the system measures the actual protein in a sample, not the nitrogen, so the results are not affected by excess nitrogen in the sample. There is no need to adulterate products with melamine, if you cannot fool the protein test being used!

¹Data from the Bureau of Labor Statistics (<http://www.bls.gov/cpi/>) and Brian Gould, University of Wisconsin -Madison (<http://future.aae.wisc.edu/tab/prices.html>).



Melamine in Dairy Products

We gathered samples from our local stores for non-fat dry milk powder and infant formula. One half of the samples were kept as received in the laboratory. The other half was spiked with a known amount of melamine. The SPRINT System was calibrated for crude protein.



Results for Non-Fat Dry Milk

Method: NFD Milk 33-36% Control Samples		
	SPRINT	Kjeldahl
	% Protein (Crude)	% Protein (Crude)
1	35.11	34.77
2	34.93	34.43
3	35.17	34.64
4	34.99	34.36
5	35.07	34.71
6	34.98	34.55
7	35.13	34.83
8	34.99	34.71
Average	35.05	34.63
Std dev	0.09	0.16
% RSD	0.2%	0.5%

The SPRINT provided a precision of 0.2% Relative Standard Deviation compared to 0.5% for Kjeldahl.

Method: NFD Milk 33-36% Samples Spiked with 1.5g Melamine/100grams		
	SPRINT	Kjeldahl
	% Protein (Crude)	% Protein (Crude)
1	34.52	40.59
2	34.58	39.52
3	34.69	40.61
4	34.73	40.59
5	34.62	39.84
6	34.51	39.39
7	34.76	38.99
8	34.72	40.88
Average	34.64	40.05
Std dev	0.10	0.71
% RSD	0.3%	1.8%

As evidenced by the results in the chart, adding melamine to the sample increased the Kjeldahl result by 5.4%, but did not affect the protein values for the SPRINT.



Results for Infant Formula

Method: Infant Formula 11%		
Control Samples: Similac Lipil Infant formula		
	SPRINT	Kjeldahl
	% Protein (Crude)	% Protein (Crude)
1	11.44	11.07
2	11.46	11.10
3	11.54	11.08
4	11.50	11.04
5	11.56	11.11
6	11.57	11.09
7	11.57	10.87
8	11.56	11.38
Average	11.53	11.09
Std dev	0.05	0.14
% RSD	0.4%	1.3%

Though the powdered infant formula was not as homogenous as other samples in this study, SPRINT still yielded very good results with a Relative Standard Deviation of 0.4% compared to 1.3% for Kjeldahl.

Method: Infant Formula 11%		
Samples spiked with 1.0g Melamine/100 g		
	SPRINT	Kjeldahl
	% Protein (Crude)	% Protein (Crude)
1	11.49	15.24
2	11.45	15.03
3	11.49	15.58
4	11.46	15.11
5	11.54	15.37
6	11.58	15.12
7	11.50	15.16
8	11.51	15.39
Average	11.50	15.25
Std dev	0.04	0.18
% RSD	0.4%	1.2%

Again, the SPRINT's protein values were not affected, while the 1.0% spike of melamine increased the Kjeldahl protein result by 4.16%. SPRINT yielded a Relative Standard Deviation of only 0.4% while Kjeldahl precision ran 1.2% RSD.

Note: The highest reported concentration in infant formula in China is approximately 0.6g/100g.

