

Milk Replacer Nutrient Evaluation – Exceptions to Typical Nutrient Analysis

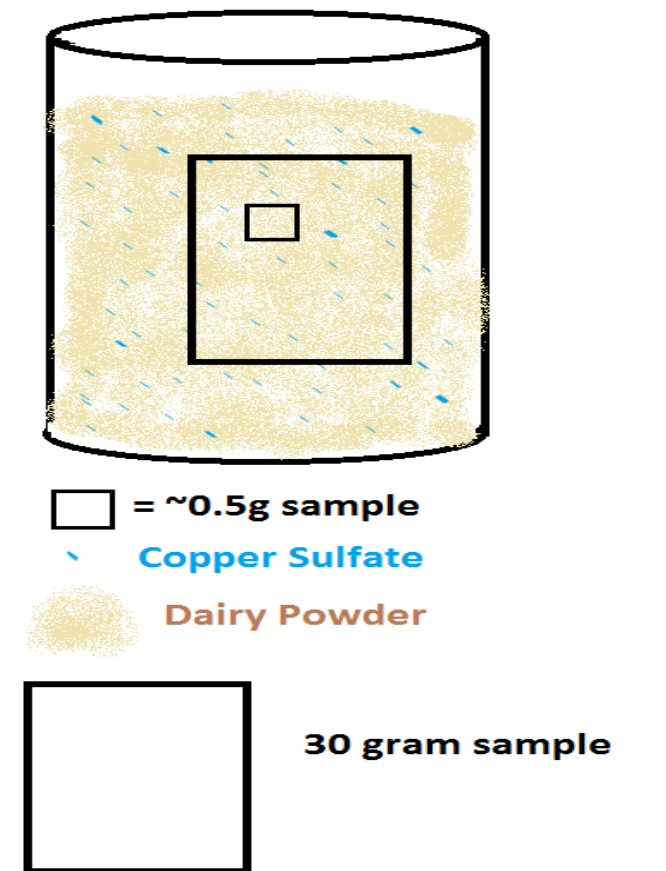
- **Dairy protein** – use 6.38 as the nitrogen factor, rather than 6.25

References:

- 1) “Standard Methods for the Examination of Dairy Products” Current edition.
- 2) “Whey and Whey Products: Definitions, Composition, Standard Methods of Analysis” Current edition.
- 3) AOAC 991.20 & 986.25
- 4) https://www.adpi.org/Portals/0/Standards/WPCStandard_book.pdf

- **Vitamins, Trace Minerals** – For Trace Minerals and Vitamins, we recommend an alternative sampling procedure - solubilizing a sample of at least 30g of milk replacer powder. Mix well in 170 grams of 110 to 120°F water, allow to sit for 5 minutes, gently mix again and immediately take an aliquot for analysis. Then calculate results based on the 15% solids solution.

This is recommended because these components of milk replacer are dry blended into dairy powders. There aren't enough particles of these components to get an even distribution in a 0.5 to 2 gram sample. Calves are minimally fed 227 grams of powder per feeding (up to 568 grams per feeding) which provides an even distribution of the nutrients. The diagram below demonstrates this principle:



- **Crude Fiber** – The traditional Crude Fiber tests (AOCS Ba 6a-05 – 2005 Edition, AOAC 962.09 – 18th Edition, AACC 32-10.01 – 11th Edition, Ankom Technology A2000 and A200I – 4/13/11 Edition) measure cellulose and lignin content. Indicating a Crude Fiber guarantee for milk replacer products is required, likely as a means of detecting soy or other vegetable protein sources in milk replacer. However, the level of crude fiber in milk replacer, even if vegetable protein is added, places it out of scope for conventional Crude Fiber testing. Analyzed fiber values for an AAFCO standard milk replacer sample sent to 88 labs in 2017 ranged such that the standard deviation was two times mean, which means the coefficient of variation of the results equaled 200%. A simple fat extraction step is part of Crude Fiber analysis. However, fat is difficult to remove from milk replacer samples, and a simple extraction is insufficient. An NH₄OH hydrolysis step (AOAC 932.06) is required because the fat is homogenized and encapsulated in a dairy protein matrix. This type of fat extraction is not recognized as part of the Crude Fiber test. Fat may therefore become an artifact (detected as fiber, when it is not). Additionally, the repeatable limit of this test is recognized as 0.3 percentage units when the fiber value is under 10% (within lab, even higher between labs). This 0.3 percentage units is very high relative to the calculated crude fiber values in milk replacer that contain vegetable protein, which typically range from 0.2% to 0.6%.

<http://www.aaftco.org/Laboratory/Proficiency-Testing-Program/Method-Performance-Reports>

- **Fat** – Use method AOAC 932.06. An alkaline hydrolysis followed by three extractions is required for accurate results, because the fat is encapsulated in a dairy protein matrix. Acid hydrolysis procedures followed by simple solvent extractions will not measure fat accurately – they will always be low.
- **Salt** – can't be determined by sodium analysis, because there are more sodium contributors in dairy products than just Sodium Chloride. Use chloride analysis instead.