Sprint Q&A

MICHAEL J. COLLINS, president and CEO of CEM Corporation

Q: What is Sprint and how does it work?

A: The Sprint is a new technology for rapidly determining total protein content in food and pet food products. It utilizes a protein tagging technique that is used in bioscience applications, which allows us to "tag" proteins and provide a direct measurement of the amount of protein in a sample. In essence, by combining protein tagging with the innovative technology in the Sprint System, we've translated and simplified this bioscience technique to the point that it has become a very rapid and easy test to run on all kinds of food products.

Q: What are the limitations of the product?

A: Obviously, it is going to be limited to samples that contain protein, as it doesn't measure other components in food right now. It's already been used on a wide variety of different applications from liquids to solids to powders and all different classes of food products, from plant to animal, so it should be applicable to a wide range. Also, we haven't found it to be affected by different compositional mixtures, so it should be possible to apply it to complex prepared food products without any significant interferences.

Q: If it's a proven technique for so many different products, why is it not widely used now?

A: This technology has never been available in a format that is conducive to use in the food industry. It does utilize some things that were developed earlier, but it combines these technologies in a way that's never been done before. Our position as a company that develops systems for a variety of different types of labs enabled us to leverage both our knowledge of bioscience applications and compositional testing to service a growing need in the food industry for truly accurate, direct protein measurement.

Q: What is direct measurement and how is it important to the method? How does it differ from the other methods currently on the market?

A: In protein testing to date, most people have had to measure the nitrogen content in a sample and then try to relate that to the protein content. It works, but obviously the disadvantage of that is you're not measuring the component you really want to measure. You're measuring nitrogen, which is contained in protein, but it's well known that there are nitrogen components in products that are not in the protein, so you have a distinct amount of uncertainty about the actual content of the product and that's always been a limitation of the current technologies.

Q: How is protein is currently analyzed?

A: All of the primary protein measurement today is based either on Kjeldahl, which is considered to be the standard method, or Dumas, the combustion method. Both measure total nitrogen content and then correlate the results back to the protein content and that's been a well-recognized limitation that can create problems. Both methods can be misled. You can have adulterated food and these tests are not going to detect the lack of protein. Infrared is also commonly used, but it's easily affected by sample matrices and other components, so people use it as a secondary method that you would correlate off of a primary method.

Kjeldahl has been around since 1883, and is not a particularly desirable test to run, but it's still being used because there has not been another technology to replace it. It is time-consuming, typically taking a couple of hours to run a sample, and it uses harsh chemicals such as sulfuric acid heated to high temperatures (up to 400 °C). Kjeldahl measures total nitrogen content from which the protein content is then calculated.

The Dumas method was thought to be a major advancement and it has had some success. Essentially, it incinerates the sample, measures the nitrogen given off, and calculates the protein. Because you are burning the sample, you must deal with all of the combustion products within the instrument, which leads to maintenance issues. It also cannot run liquids or large sample volumes. The larger the sample you try to run in a Dumas system the more problems you have, so it's forced people to run smaller sample sizes than they typically want to run (down to a tenth of a gram) to get the instruments to run properly.

Q: How does Sprint compare to current methods?

A: First of all, it's fast. You're typically looking at 2 minutes or less to get a result compared to 2 hours for the current Kjeldahl method. Sprint is simple to operate. It uses disposable kits: all the operator has to do is weigh the sample out, put it in the instrument, and push a button, and it'll give you a result in 2 minutes. All of the methods are pre-loaded and using the interface is as easy as making a call on your cell phone. You get direct readings based on pre-loaded methods. Another major advantage is safety. You're not dealing with any harsh chemicals, high temperatures, or unusual conditions, so you can actually run this system in normal laboratories or even out in other areas. It also is very green technology in that it doesn't generate any hazardous waste. Current Kjeldahl methods generate hazardous waste with sulfuric acid and metal catalysts that have to be disposed of.

Q: Greener technologies seem to be more expensive, especially when first introduced. How does Sprint stack up in comparison to other methods in affordability?

A: This is actually an unusual situation in that the newer, greener technology turns out to be less expensive and that's not always the case. The acquisition cost is less expensive than typical Kjeldahl equipment or combustion systems. The cost per test, which is the more important question, is actually substantially lower. Kjeldahl costs approximately $5/test in terms of purchasing chemicals, replacing glassware as it breaks, and the disposal of the chemicals that are used, not including the labor cost. The running cost on the Sprint will only be about $3/test in terms of consumables, so it's substantially less than the Kjeldahl. The cost of running a combustion system is similar to the Sprint. The advantages over combustion would be that it's a direct measurement, you can run larger samples and it's faster.

Q: As the Sprint becomes more widely used and accepted, how do you think people will benefit from it?

A: It will allow testing to be done more reliably and easily than is possible using current methods. Sprint offers companies more flexibility to use protein testing where they want to use it and the means to control protein more effectively, which will assist in monitoring food production and food safety.

Q: What approvals does this technique have?

A: It has approval for all of the major dairy (AOAC) and grain (AACC) applications. We have AOAC studies underway on the meat applications, which we expect to be complete in the next 6 months.

CEM Corporation, a private company based in Matthews, North Carolina, is a leading global provider of progressive and innovative technologies that answer the need for advanced solutions for critical laboratory applications in compositional testing, analytical chemistry, chemical synthesis, and bioscience. Founded by a chemist, CEM pioneered the field of microwave chemistry and has always had a chemist-driven R&D program. CEM supports educational initiatives in the field of science and is pleased to offer the Stacey Palasek Memorial Scholarship, the MJ Collins Award, and academic grants for equipment. CEM has subsidiaries in the United Kingdom, Germany, Italy, and France, as well as a global network of distributors.

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