

One platform, endless possibilities

The Agilent 2100 Bioanalyzer is an indispensable tool for food chemists and biologists.



Now you can have a multi-purpose platform that streamlines your workflows from product development to QA/QC of bulk materials and finished food products. The Agilent 2100 Bioanalyzer can handle all your needs, whether you want to measure protein content in seeds, bulk material or finished product; measure DNA or RNA for molecular detection of genetically modified organisms, allergenic species or pathogens; or count cells.

Uniquely, the 2100 Bioanalyzer performs both electrophoretic separation and flow cytometric analysis of cell fluorescence parameters. It is rapidly replacing gel electrophoresis for DNA fragment analysis and SDS-PAGE analysis of protein samples.

Versatile, fast and mess-free

The Agilent 2100 Bioanalyzer is the industry's *only* platform that can cover your entire workflow with a single compact system. The first commercial, analytical instrument based on lab-on-a-chip technology, the 2100 Bioanalyzer has proven to be an excellent alternative to antibody-based, labor-intensive gel electrophoresis. This technology replaces subjective, time-consuming techniques associated with agarose or SDS-PAGE slab gels with fast, automated, high quality digital data.

Advantages of miniaturization

Miniaturization of analytical instrumentation has a number of advantages over conventional techniques:

- Data precision and reproducibility
- Short analysis times
- Minimal sample consumption
- Improved automation
- Integration of complex workflows

Answers within minutes

The 2100 Bioanalyzer provides you with a convenient and productive way to gather and store experimental and routine test data. Automation and standardization of different processes on a chip give you high quality digital data fast, increasing lab productivity. *You get answers within 30 minutes.*



Pre-packaged LabChip kits, which include sample-specific reagents and chips, let you analyze specific sample classes. A variety of kits for RNA, DNA, protein and cell assays are currently available to meet your needs.



Agilent Technologies

Why you need to test-drive the **Agilent 2100 Bioanalyzer**

Advantages of the Agilent 2100 Bioanalyzer

- Faster than gels—digital data for up to 12 samples within 30 minutes
- Reproducible and complete digital data
- Compliance Service options allow you to work within regulated environments (particularly QA/QC labs)
- 2100 Expert Software for easy digital handling and storage of all bioanalyzer data
- Multiplex detection capabilities

Advantages of Agilent's lab-on-a-chip technology

- Minimal sample consumption and fast results
- Improved assay accuracy and precision
- Digital data for convenient archiving and storage
- Various data display options
- Ease-of-use with simplified sample-to-sample comparison
- Minimum exposure to hazardous materials

Digital data

The 2100 Bioanalyzer provides fully digital data easily shared with colleagues worldwide. The fully functioning data analysis software is available free at <http://www.chem.agilent.com/cag/wad/registration/2100expert.asp>

1 Fast and easy operation Add sample



- Ready-to-use reagent kits
- Quick-start instructions
- Chip preparation in less than 5 minutes
- Minimal use of hazardous chemicals and waste disposal
- Sample volumes in the μL -range

2 Automation Start chip run



- Start analysis at the press of a button
- Predefined protocols
- System uses internal standards to calculate results

3 Digital data in 30 minutes Watch real-time data display



- Automated data analysis
- Digital data can be filed in a database or shared
- No user-dependent data interpretation

Food safety applications



Nuts and allergens

The 2100 Bioanalyzer is more cost effective and reduces labor compared to other test methods. Recent regulatory and policy changes in the United States (US), European Union (EU), Japan, Canada and Australia require labeling of multiple allergens in food products. EU regulations, for instance, identify eight nut species that must be declared on the ingredient list.

Currently available allergen content tests for food products and materials often have difficulty in complex matrices and usually detect only a single allergen per test. In contrast, the 2100 Bioanalyzer coupled with molecular detection techniques (PCR) can cost-effectively screen for multiple allergens using a single test.

The electropherograms shown in Figure 1 demonstrate multiplex detection of three nut species—Brazil nut (*Bertholletia excelsa*), pistachio nut (*pistacia vera*) and macadamia nut (*macadamia integrifolia*)—in a single run. Furthermore, the bioanalyzer, which uses only 1 µl of reaction mixture to load onto the LabChip, can reduce PCR volumes by up to 75 percent compared to standard gel-electrophoresis, which requires 10 to 15 µl, saving reagent costs.

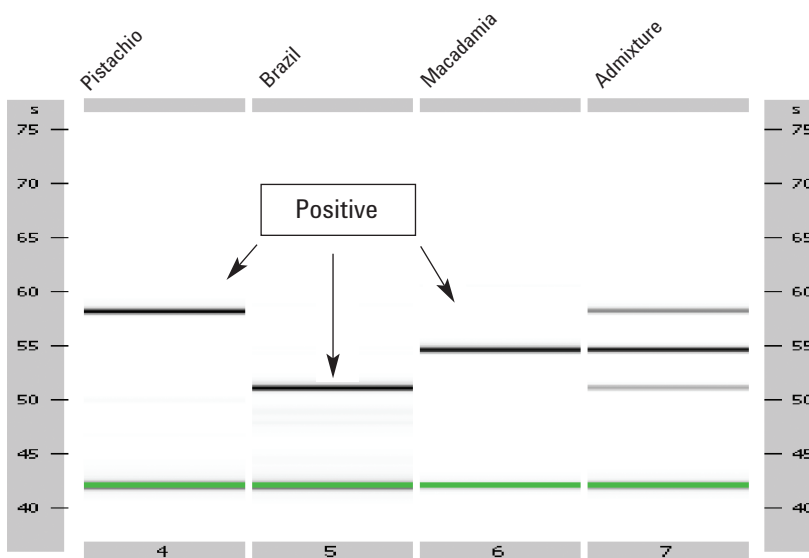


Figure 1: Cost-effective screening for multiplex PCR reaction product for nut allergen species in food using a single test. The 2100 Bioanalyzer's gel-like image shows positive test results for pistachio nut (lane 4), Brazil nut (lane 5) and macadamia nut (lane 6), as well as for a mixture of these three nuts (lane 7) in wheat.

Source: Campden and Chorleywood Food Research Association Group, Gloucestershire, UK.

Food safety applications

Genetically modified organisms

The number of genetically modified organisms (GMO) and regulatory requirements for testing and labeling continue to increase. Many countries now require GMO content labeling—or ban GMO materials altogether. Antibody tests to detect GMO proteins often require individual tests for each suspected GMO organism/event. Test accuracy can be problematic in processed materials where detected proteins may become denatured or damaged.

The 2100 Bioanalyzer, in conjunction with an appropriate PCR kit, offers multiplex screening to detect and identify multiple GMO events in processed foods, improving test accuracy and reducing the number of tests, which in turn reduce costs. Figure 2 shows multiplex detection of GMO in corn meal and soybean powder.

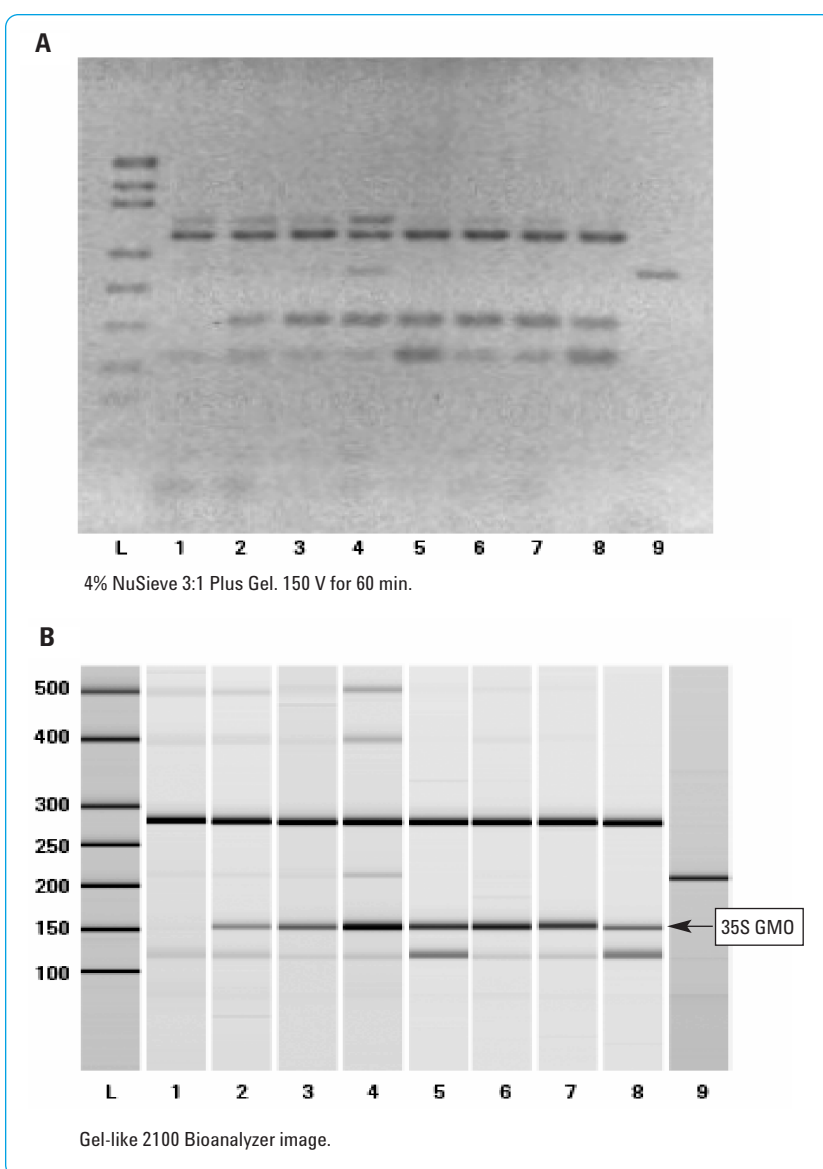


Figure 2. Comparison of slab gel electrophoresis (A) with Agilent 2100 Bioanalyzer gel-like image (B) in detecting multiple GMO events in corn meal and soybean powder. Samples: L) molecular weight ladder (26, 34, 67, 89, 110, 147, 190, 242, 353, 404, 489 and 501 bp); 1) 0% MON810 corn; 2) 0.1% MON810 corn; 3) 0.5% MON810 corn; 4) 1.0% MON810 corn; 5) 2.0% MON810 corn; 6) 5.0% MON810 corn; 7) commercial corn meal; 8) Allin positive control—0.5% Bt 176 maize and 0.5% Roundup Ready soybean; and 9) negative control (de-ionized water). Band identification: 118 bp—soy lectin; 153 bp—35S GMO; 217 bp—PCR reaction internal control; 278 bp—corn zein.

Meat and fish

The multiplex detection capability of the 2100 Bioanalyzer can also determine food product authenticity, its source and homogeneity. For example, meat authenticity is an important factor for economic as well as religious and cultural reasons.

Identifying authenticity and homogeneity of the meat source is difficult for processed meats in which proteins may be damaged by heat, rendering antibody-based tests inaccurate. Using molecular detection methods (PCR), the 2100 Bioanalyzer successfully determines meat species and sample homogeneity in one test, reducing the number of tests required and thereby reducing labor and testing costs.

Figure 3 shows the bioanalyzer's ability to detect turkey, lamb or pork in a variety of meat samples while discriminating for other various matrices such as fish or grain.

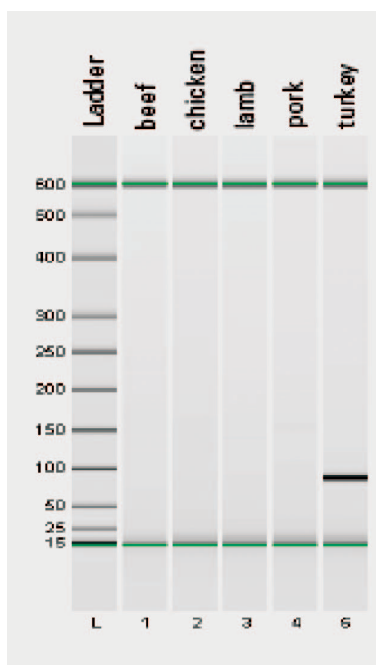


Figure 3. The 2100 Bioanalyzer can detect multiple targets at one time, including turkey, lamb or pork in a variety of meat samples. The dark band (lane 6) indicates a positive molecular test (PCR) for turkey. Negative tests (lanes 1 through 4) demonstrate test discrimination for other meat products (beef, chicken, lamb and pork).

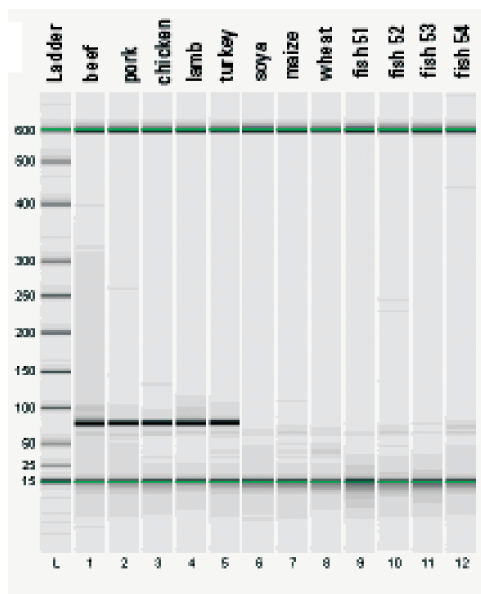


Figure 4. Agilent 2100 Bioanalyzer gel-like image showing PCR test designed to discriminate meat. Positive results are evident in lanes 1 through 5 for various meat products. Lanes 6 through 12 show negative results for grain and fish.

Source: Campden and Chorleywood Food Research Association Group, Gloucestershire, UK.

Food safety applications

Dairy: Milk protein

In addition to DNA analysis for molecular detection applications, the 2100 Bioanalyzer can detect and quantify proteins to determine protein source, quality and content. Figure 5 demonstrates determination of protein content to check the authenticity of the milk source (such as goat, sheep or cow) as well as determine the protein content and quality for in-process or finished product QA/QC.

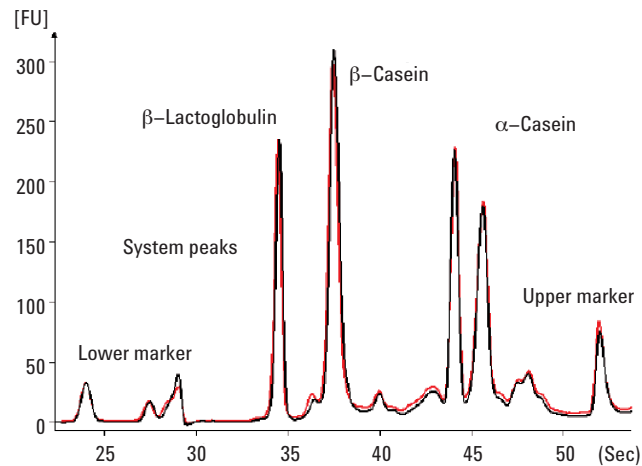


Figure 5. Milk protein analysis. The 2100 Bioanalyzer protein assay provides rapid analysis of milk proteins. Shown here are two overlaid electropherograms of bovine milk (dil. 1:10; peaks identified by separately analyzing individual protein standards).

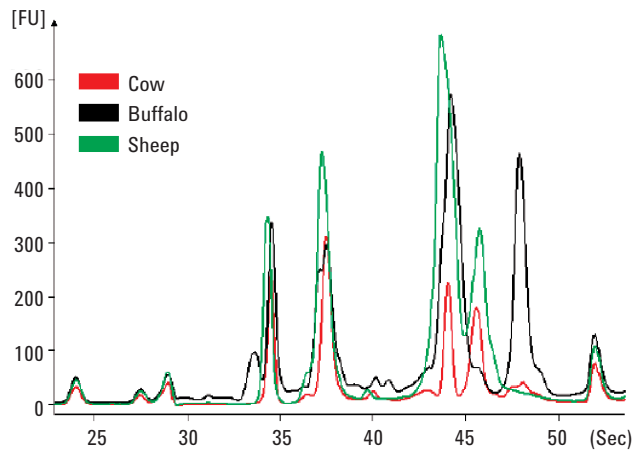


Figure 6. Milk authenticity. The 2100 Bioanalyzer protein assay also provides a rapid means to determine product authenticity quickly. Shown here are three overlaid electropherograms of milk samples (dil. 1:10) from different sources. In this example, milk samples from cow, buffalo and sheep are differentiated quickly based on relative milk protein content.

Wheat

Because the 2100 Bioanalyzer can electrophoretically separate complex protein samples, providing both protein molecular weight and quantity, you can use pattern matching of the resulting electropherogram to determine product authenticity as an alternative (or complement to) molecular detection methods. For

example, verifying seed variety and quality is important economically because high quality and desirable seeds usually command a premium price. For many milled materials such as wheat flour, protein quality and quantity determine the suitability of the flour for the intended finished product. In a single test, the

2100 Bioanalyzer can determine both the genetic identity of various wheat varieties (DNA analysis) and protein content for either variety identification or product quality control. Figure 7 shows wheat variety identification based on protein pattern.



Pattern matching can identify the particular strain of wheat, in this case Halberd.

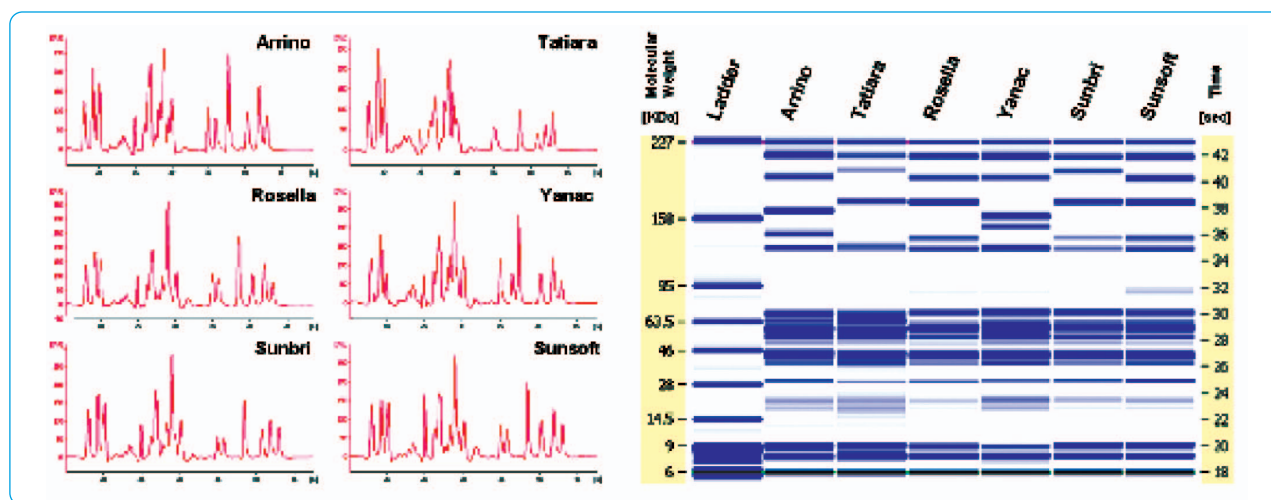


Figure 7. Protein patterns obtained by the 2100 Bioanalyzer's protein chip identify various kinds of wheat. This figure covers extracts (1% SDS + 1% DTT) of six wheat varieties: Arrino, Tatiara, Rosella, Yanac, Sunbri and Sunsoft. The elution profiles from size-based capillary electrophoresis appear on the left, corresponding to the simulated gel patterns at right.

Source: S. Uthayakumaran, I.L. Batey, C.W. Wrigley, Value Added Wheat CRC and Food Science Australia, North Ryde, Australia.

**Compact, robust and
simple to use**



For more information

To learn more about the Agilent 2100 Bioanalyzer and additional food applications, go to:

- <http://www.agilent.com/chem/labonachip>
- <http://www.agilent.com/chem/foods> and click "Bioanalysis" and "Applications"

You can also call 1-800-227-9770 (in the U.S. and Canada) or contact your local Agilent representative or Agilent Authorized Distributor.

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