



Rapid, Cost-Effective, and High-Throughput Genetic Screening for Commercial Agricultural Applications

- ✓ Livestock parentage verification
- ✓ Crop strain validation and marker-assisted selection
- ✓ Candidate genetic marker evaluation
- ✓ Quantitative trait locus (QTL) detection
- ✓ Phenotype selection

Overview

Genome-wide association and sequencing studies have identified a vast number of genetic markers which are now being used in molecular breeding of plants and animals for a variety of improvements, including increased production yields, disease resistance, abiotic stress tolerance, and nutrition.

Commercial agriculture and livestock testing operations require high-throughput, large-scale methodologies with low-cost workflows, often unobtainable with more costly next generation sequencing platforms. With proven accuracy, sensitivity, and versatility, the MassARRAY® System—including iPLEX® chemistry and Assay Design Suite software—provides a powerful solution for downstream marker validation and genomic screenings.

FLEXIBLE, SCALABLE, AND LOW-COST GENETIC TESTING OF ANIMALS AND CROPS

Cost-effectively (pennies per genotype) and accurately evaluate up to 60 SNPs in a single reaction well. Rapidly design and validate routine panels. Easily modify existing panels to include additional content with minimal effort and reagent costs.

ROBUST, LARGE-SCALE GENOTYPING

Ideal for routine testing of 10s to 100s of markers, the MassARRAY System allows you to generate over 200,000 genotypes daily with minimal hands-on time.

Pre-designed or custom-designed panels include premixed primers and reagents available in 24-, 96-, or 384-well formats. Run up to 23,040 SNPs per 384-format chip. Analyze and view results in less than an hour.

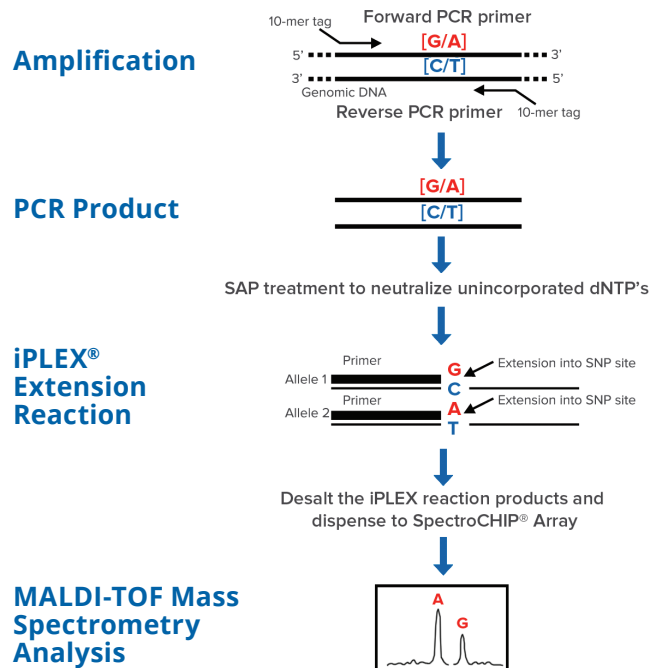
VERSATILE SCREENING FROM ANY SAMPLE

Screen hundreds of thousands of samples per year with just 5-10 ng genomic DNA per reaction from any biological source, including:

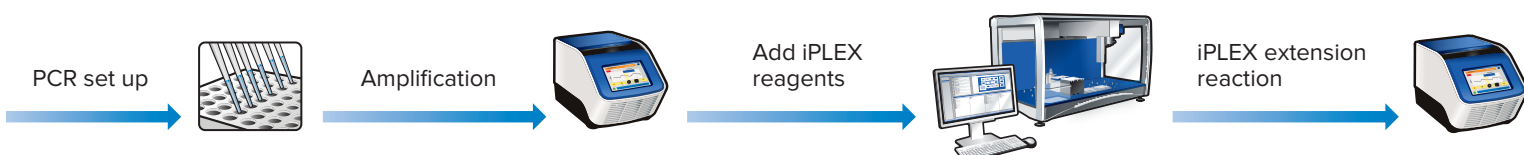
- Blood, plasma, serum, sputum, saliva, and semen
- TypiFix™, ear punches
- FTA® cards (blood, semen, and nasal)
- Seed, root, and leaf samples
- Fresh frozen tissue and biopsy samples

ACCURATE, RELIABLE RESULTS

Achieve industrial-scale testing success with > 99% call rates and > 99.7% accuracy for any organism using proven iPLEX chemistry.



Easy-to-Use MassARRAY® System Workflow

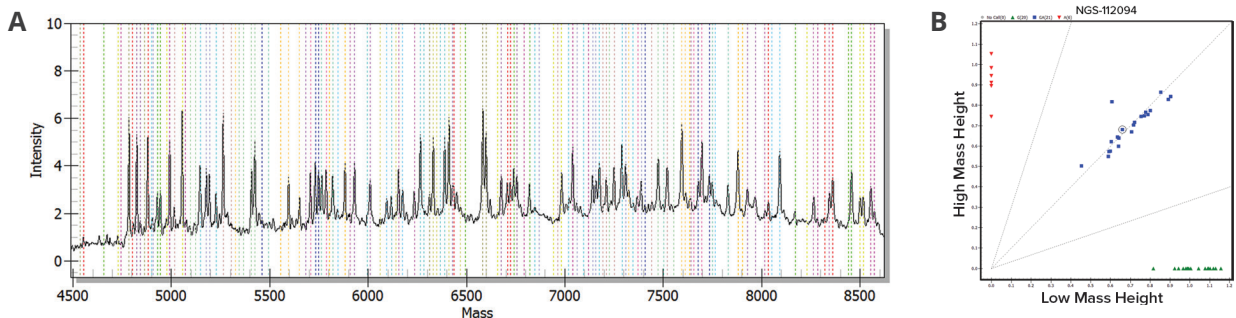


From Genomic Discoveries to Commercial Applications



PARENTAGE VERIFICATION FOR LIVESTOCK BREEDING

SNP-based genotyping applications have become increasingly valuable to the commercial livestock industry. Genetic and parental identification is important for managing selective breeding efforts, determining pedigree, tracking farm of origin, and for animal forensic identification. Many production labs and service providers use the MassARRAY System and iPLEX chemistry to routinely screen large numbers of sheep, cattle, pig, fish, and other livestock species, generating huge economic value to farmers, breeding companies, and downstream commercial groups.



100-200 SNPs are required for discriminating inbred dairy herds (*B. taurus* and *B. indicus*). Two multiplexes of 53 and 47 SNPs were designed using standard iPLEX design conditions, generating MassARRAY spectra with discernable peaks (A) and a cluster plot (B) demonstrating higher than 99% call rates with greater than 99.7% accuracy.



MARKER-ASSISTED TRAIT SELECTION

Recent technology advances make it possible to routinely analyze genetic markers to characterize phenotypes and select for specific alleles implicated in favorable traits such as increased parasite and disease tolerance, and improved production. With the MassARRAY System, up to 60 SNPs* can be evaluated in a single-well assay, enabling high-throughput results for pennies per genotype.

Virus Susceptibility in Sheep

In a recent study, researchers used the MassARRAY platform to assess genetic variation in the transmembrane protein 154 gene (*TMEM154*) associated with high susceptibility to a pneumonia virus (OPPV) in sheep. Using standard iPLEX biochemistry, an accurate and efficient genetic test was developed to selectively reduce susceptibility and improve the health and productivity of infected flocks.

—Heaton MP *et al.* *PLoS One* 2013;8(2)

* iPLEX assay optimization and software enhancements are required for higher-plex assay designs. Contact Agena Bioscience Customer Support for assistance in designing a panel for your needs.

Nanodispensing onto the SpectroCHIP® Array



MALDI-TOF MS



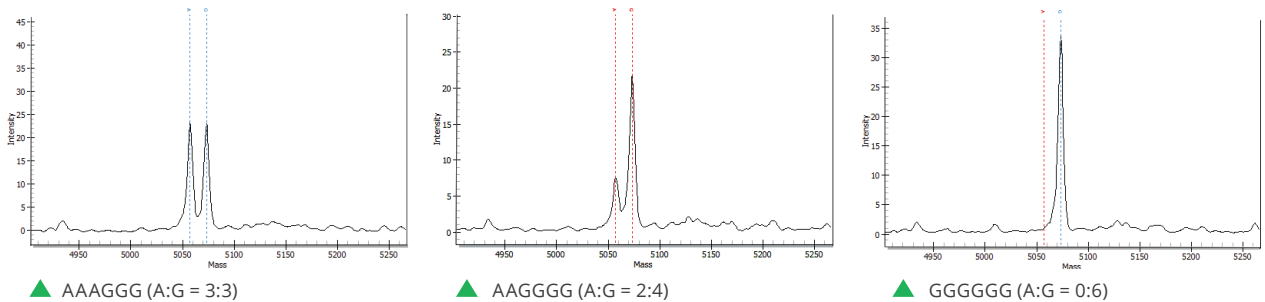
Report generation





CROP STRAIN VALIDATION IN POLYPLOID PLANTS

Polyploid plants such as coffee, cotton, wheat, and potato can be difficult to genotype. The MassARRAY System provides an automated solution for determining which genomes carry a particular region of interest and ascertaining the underlying (hidden) allelic dosage and ancestral state of polyploid species.



The allelic frequency of a hexaploid plant (wheat) can be measured using the height area of the iPLEX extension product peaks generated with the MassARRAY System, providing quantitative, highly polymorphic, co-dominant results in a cost-effective and automated high-throughput format.

VERSATILE, HIGH THROUGHPUT, LOW COST GENOTYPING

Around the world, scientists are working on applying today's research results to tomorrow's agricultural breakthroughs. The MassARRAY System offers the versatility, high throughput, low cost, and unmatched performance for today's agricultural research.

PUBLISHED STUDIES USING THE MASSARRAY SYSTEM



Agena Bioscience scientists and Certified Service Providers have assisted a number of premier agricultural institutions with their genotyping needs, enabling hundreds of thousands of screening projects per year. More than 30 customized panels using the iPLEX biochemistry have been developed for use with the MassARRAY platform. Species panels include cattle, horse, swine, sheep, deer, alpaca, dog, shrimp, salmon, rice, cotton, corn, *Arabidopsis*, sugarcane, wheat, and many more. View our publications web page at www.agenabioscience.com to see how the MassARRAY technology can power your commercial agricultural applications today.

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