



Axiom genotyping arrays for agrigenomics

Trusted genetics for your genomic
selection and breeding programs

The application of genomics in agriculture

Agrigenomics research is growing as climate change, population growth, and urbanization threaten the ability of farmers to meet the world's food demands. To address these needs, breeders and farmers are employing new genomic strategies in order to use fewer environmental resources to develop higher-producing livestock, poultry, and crops, and to use fewer antibiotics and pesticides.

It is important that your agrigenomics genotyping solution be reliable and flexible and incorporate markers to address the following applications:

Genomic selection

Genomic selection aims to improve quantitative traits in large breeding populations through the use of whole-genome molecular markers. Genomic prediction combines marker data with phenotypic and pedigree data, when available, to increase the accuracy of predicting breeding and genotypic values.

Marker-assisted selection (MAS) and marker-assisted breeding (MAB)

MAS and MAB efficiently select for desirable traits during breeding, where a trait of interest is selected based on a marker linked to that trait, rather than based on the trait itself.

Parentage

DNA parentage testing is a valuable tool that allows breeders to confidently select elite animals, knowing their ancestry is correct. It can be used to fast-track genetic progress or confirm parentage, and may determine if an animal carries defective genes—helping to avoid defects in future offspring.

Characterization of genetically modified organisms (GMOs)

Researchers develop genetically modified animals and plants to increase yield, decrease susceptibility to disease, and minimize use of antibiotics in production facilities.



Accelerate your marker–trait association and genomic-selection efforts

Axiom Genotyping Solution for agrigenomics

Powerful

- Genotype any species, genome size, and ploidy, including complex mosaic genomes
- Include markers for multiple species on a single array with no restrictions on number of markers per species
- Interrogate insertion or deletion polymorphisms (indels) and ensure inclusion of all candidate single-nucleotide polymorphisms (SNPs) with neighboring SNPs as close as 10 base pairs away, enabling more effective quantitative trait loci (QTL) analysis
- Utilize the powerful yet simple data analysis software included at no extra cost

Robust

- Highly specific, ligation-based, two-color enzymatic assay that enables reliable design and detection of complex markers
- Robust and 100% reproducible manufacturing process that helps to ensure no loss of any SNPs

Candidate SNP



Neighboring SNP



CGATCGGGG(C/G)ATTCGCGATCGCGAGAGTTG(A/T)TATCGAGCGCGA

Both SNPs can be genotyped in the Axiom assay.

Scalable

- Fully automated workflow that can process up to 8 array plates per week with a single Applied Biosystems™ GeneTitan™ Multi-Channel (MC) Instrument
- High-throughput, flexible array layout with the ability to process between 96 and 6,144 samples per week



Catalog and custom 96-, mini 96-, and 384-array plates



Automated and manual target preparation options



Robust, reliable assay



Hands-free, automated array processing



Simple, free automated analysis software



Export tools and companion modules

The Applied Biosystems™ Axiom™ Genotyping Solution for agrigenomics includes arrays with genotype-tested content from the Applied Biosystems™ Axiom™ Genomic Database

or *de novo* markers that are important to you. The full solution comprises arrays, reagents, automated and manual workflows, and simple, free data analysis software.

Customized arrays to meet your specific needs

Axiom myDesign Custom Genotyping Arrays

The Applied Biosystems™ Axiom™ myDesign™ Custom Genotyping Array program offers a fast, affordable way to create tailored and fully custom arrays for individual researchers or consortia. Partner with our bioinformatics team to design arrays with relevant, specific content for your studies.

Consistent supply and fast turnaround times

- Get 100% identical SNP content with every order for as long as your research requires
- Use *in silico* design scores to maximize the number of markers that will generate successful genotypes
- Receive new custom arrays approximately 6 weeks after final design review

High-density screening

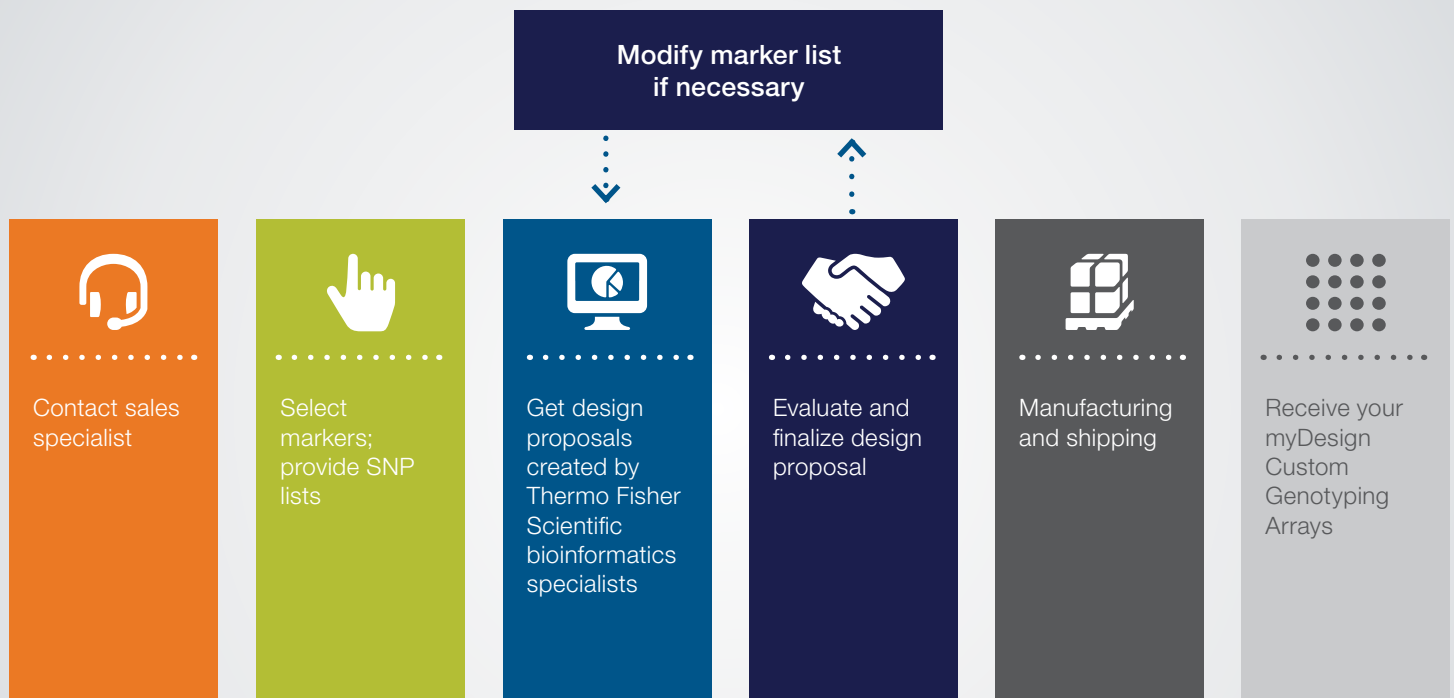
- Validate sequencing SNP discovery with a screening array, and then select the most informative SNPs to design an array for routine downstream high-throughput genotyping

Flexible

- Select from a variety of formats to meet your needs: 96-, mini 96-, and 384-array plates
- Multiplex 500–675,000 SNPs per array at an affordable price, enabling you to get more information from your investment

Scalable

- Low up-front sample commitment (as few as 480 samples) to fit your budget
- Reorder custom arrays for as few as 192 samples to complete your study



Expert predesigned arrays for your species of interest

Expert and catalog array designs

Plants and crops

We have created Axiom genotyping array designs for a variety of difficult-to-genotype plants, including potato, strawberry, wheat, maize, and ornamental plants. Applications include complex trait research such as polyploid linkage maps, identification of multi-SNP haplotypes in progenies and breeding material, and molecular breeding.



Axiom genotyping arrays can help accelerate and increase the efficiency of cultivar development.

Livestock, poultry, and farm animals

Genotyping is becoming a common practice in animal breeding. High- to low-density Axiom genotyping arrays can be used to make timely genomic selection and parentage breeding decisions. Understanding inheritance characteristics across and within multiple breeds is also possible.

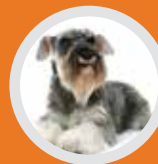


“The Axiom platform is a hugely informative and multifunctional platform, which has the potential to trigger a paradigm shift in not only sustainable sheep breeding but also the optimal management of sheep flocks.”

–Dr. Donagh Berry, Teagasc, Moorepark, Ireland

Companion animals

The dog has emerged as a premier species for the study of morphology, behavior, and disease. By capturing more of the genomic variation in each dog, Axiom genotyping arrays enable powerful genome-wide association studies (GWAS) in populations that include mixed-breed dogs or multiple breeds.



Aquaculture

Aquaculture is one of the fastest-growing food industries in the world, yet it is estimated that only 10% of aquaculture production is based on genetically improved stocks. Pedigree in aquaculture species is often costly and difficult to obtain, making development of optimized selective breeding programs challenging. Axiom genotyping arrays can be designed for complex mosaic genomes such as those of salmon.



“Axiom genotyping technology has taken Marine Harvest into the genomic era and is playing a key role in the realization of the enormous potential that lies within our Atlantic salmon breeding program.”

–Dr. Matthew Baranski, Marine Harvest, Bergen, Norway

Automated genotype calling for diploids and polyploids with free software

Axiom Analysis Suite software

Applied Biosystems™ Axiom™ Analysis Suite software integrates SNP genotyping, indel detection, copy number analysis and off-target variant (OTV) calling of simple and complex genomes in an easy-to-use graphical interface.

Powerful statistics

- Axiom clustering and genotyping algorithm (AxiomGT1) features adaptive, dynamic clustering that employs statistical methods for accurate genotyping of diploid and polyploid species
- Employs statistical approaches to accurately ascertain specific SNP cluster patterns and automatically assign correct genotypes
- Performs fixed region copy number and *de novo* copy number analysis

Seamless integration with your existing systems

- Automation-friendly option with command line-based tools

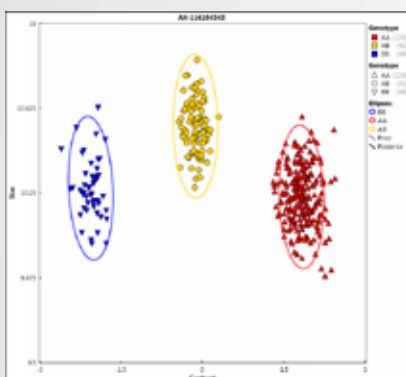
– Simple export of Axiom genotyping array data into long format for easy analysis with existing bioinformatics pipelines using the Applied Biosystems™ Axiom™ Long Format Export (AxLE) Tool

– Easy reformatting and uploading of Axiom genotyping array data into the Council on Dairy Cattle Breeding (CDCB) database with the Applied Biosystems™ CDCB Export Tool

Multiple interpretation tools

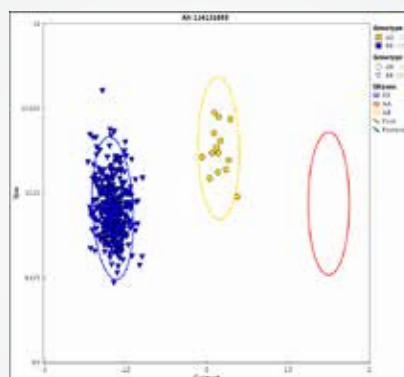
- Includes flexible SNP filtering and tools for exporting to PLINK format
- Provides customizable visualization tools
- Classifies the SNPs into categories that enable you to assess the quality of the genotypes
- Easily export and visualize CNVs and loss of heterozygosity (Integrative Genomics Viewer compatible)

Polymorphic,
high-resolution clusters



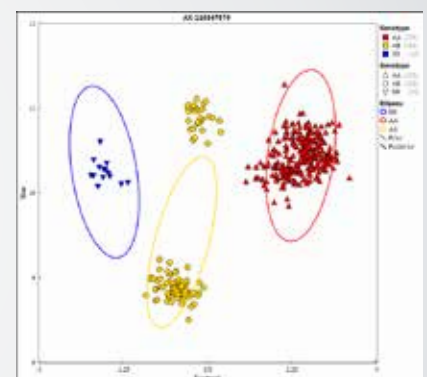
Good cluster resolution with at least two examples of the minor allele.

No minor homozygous,
high-resolution clusters



Two clusters with no examples of the minor allele.

Off-target,
variant clusters



Reproducible yet uncharacterized variants caused by double deletion, sequence non-homology, or DNA secondary structure.

A single platform for every phase of your breeding program

The Axiom Genotyping Solution for agrigenomics provides breeders and researchers with powerful and flexible genotyping tools to cost-effectively identify, verify, and screen complex genetic traits in plants and animals. Our array-based agrigenomics genotyping solution is ideal for applications ranging from genome-wide analysis to routine screening, with very high accuracy and reproducibility, a straightforward workflow, and 100% fidelity to ensure there are no SNP dropouts.



Ordering information

Products	Number of markers	Format	Cat. No.
Plants and crops			
Axiom Apple Genotyping Array	480,000	96-array	550573
Axiom Citrus HD Genotyping Array (Citrus15 AX1)	702,244	96-array (2-array set)	550729
Axiom Citrus HD Genotyping Array (Citrus15 AX2)	702,198		550730
Axiom Citrus Genotyping Array	58,433	384-array	550775
Axiom Cotton Genotyping Array	35,550	96-array	550563
Axiom Maize Genotyping Array	616,201	96-array	550494
Axiom Peanut Genotyping Array	47,837	384-array	550846
		Mini 96-array	550865
Axiom Rice Genotyping Array	49,600	96-array	550625
	44,000	384-array	550838
Axiom Rose Genotyping Array	137,786	96-array	550450
Axiom Rye Genotyping Array	600,843	96-array	550535
Axiom Soybean Genotyping Array	180,961	96-array	550469
Axiom Strawberry Genotyping Array (iStraw90K)	95,062	96-array	550466
Axiom Strawberry Genotyping Array (i35)	34,260	384-array	550767
		Mini 96-array	550827
Axiom Tomato Genotyping Array	51,214	96-array	550497
Axiom Wheat HD Genotyping Array (Bristol W1)	817,000	96-array (2 array set)	550491
Axiom Wheat HD Genotyping Array (Bristol W2)			550492
Axiom Wheat Breeders Genotyping Array	35,000	384-array	550524
Livestock and poultry			
Axiom Genome-Wide BOS 1 Bovine Array Kit	648,855	96-array	901791
Axiom Bovine Genotyping V2 Array	>67,000	384-array	550950
		Mini 96-array	550951
Axiom Bovine-Ovine-Caprine Genotyping Array	54,560 (bovine) 60,000 (ovine) 54,236 (caprine)	96-array	550627
Axiom Buffalo Genotyping Array	90,000	96-array	550431
Axiom Genome-Wide Chicken Array Kit	580,000	96-array	902148
Axiom Equine Genotyping Array	670,796	96-array	550583
Axiom Equine Plus Genotyping Array	670,800	96-array	550624
Axiom Ovine Genotyping Array	51,000	384-array	550898
	51,000	Mini 96-array	550947
Axiom Porcine HD Genotyping Array	658,692	96-array	550588
Axiom Porcine Breeders Genotyping Array	55,232	384-array	550833
		Mini 96-array	550855
Axiom Turkey Genotyping Array	643,845	96-array	550538
Aquaculture			
Axiom Salmon Genotyping Array (<i>Salmo salar</i>)	430,743	96-array	550540
Axiom Catfish Genotyping Array	693,567	96-array	550704
Axiom Coho Salmon Genotyping Array	200,000	96-array	550862
Axiom Oyster Genotyping Array	55,575	384-array	550796
Axiom Trout Genotyping Array	57,501	96-array	550468
		384-array	550571
Companion animals			
Axiom Canine Genotyping Array Set A	460,000	96-array	550771
Axiom Canine Genotyping Array Set B	670,000	96-array	550772
Axiom Canine HD Genotyping Array	712,893	96-array	550869
Model organisms			
Axiom <i>Aedes aegypti</i> Genotyping Array	50,000	96-array	550481
Axiom Mouse Genotyping Array	616,136	96-array	550810
Axiom Rabbit Genotyping Array	200,000	96-array	550669

Arrays for additional species may become available as we continue to grow our product line. Please check online or with your sales representative for the most up-to-date information.

Learn more about Axiom genotyping arrays for agrigenomics at thermofisher.com/microarrays

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