

## Agrigenomics Genotyping Solutions

Easy, flexible, automated solutions to accelerate your genomic selection and breeding programs



# Agrigenomics genotyping solutions

A single platform for every phase of your study

Agrigenomics genotyping solutions from Affymetrix provide breeders and researchers with a powerful and flexible range of genotyping tools to cost-effectively identify, validate, and screen complex genetic traits in plants and animals.

## Affymetrix' genetic analysis tools give you the power to

### Discover

- Ascertain *de novo* genetic diversity through genetic analysis technologies
- Analyze population structure

### Associate

- Identify genetic markers correlated with desirable traits
- Confirm marker-trait associations
- Understand genetic adaptation to the environment

### Manage

- Use genetic information to control desired outcomes
- Screen plants and animals for desired traits
- Expedite genetic progress with high accuracy

## Benefits of array-based genotyping

### Affordability

- Cost-effective genotyping tools

### Simplified genotyping tools

- Consolidate multiple genotyping applications under a single technology platform
- Easy-to-use and simple workflow
- Obtain accurate genotyping answers in a few hours

### Flexibility

- High-throughput genotyping tools for high-density to targeted genotyping applications
- An assay for unconstrained genotyping of **all** relevant markers of interest
- Low sample commitment

Array-based genotyping products from Affymetrix offer complete solutions for applications ranging from genome-wide analysis to routine screening with the highest accuracy and reproducibility, a straightforward workflow, and the lowest cost.

# Axiom® Genotyping Solution

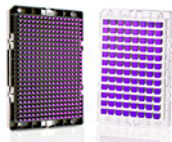
Accelerate phenotype-trait association and selection efforts with a robust technology

Axiom Genotyping Solution for agrigenomics includes arrays with genotype-tested content from the Axiom® Genomic Database or *de novo* markers that are important to you.



Genotype-tested or newly discovered SNPs

Customized design consultation



Axiom® pre-designed and custom arrays

96 or 384 samples per array plate



Axiom® target preparation solutions

Manual and automated options available



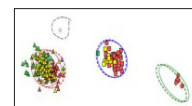
Axiom® Reagent Kit

Robust and reliable assay



GeneTitan® Instrument

Hands-free array processing and imaging



Genotyping Console™ Software and Affymetrix® Power Tools

Genotyping analysis software

## Powerful

- Genotype any species, genome size, and ploidy level
- The Axiom® assay can interrogate insertion/deletions (indels) and **guarantees** inclusion of all candidate SNPs with neighboring SNPs as close as 20 bp away, enabling more effective QTL analysis



## Robust

- Start genotyping with only 100 ng of extracted DNA from a variety of sample types
- Genotype call rates  $\geq 99\%$

## Scalable

- Fully automated workflow with the option to process up to 8 sample plates per week with a single GeneTitan® MC Instrument
- High-throughput flexible array layout with 96 or 384 samples per plate

## Plant genotyping

Access expert designs for your species of interest

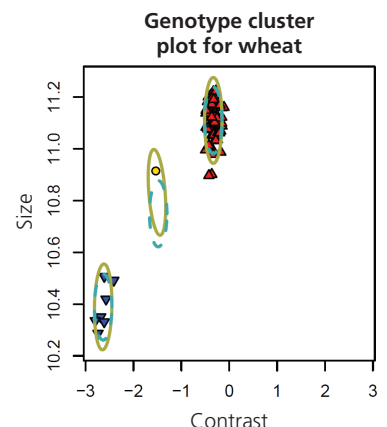
Affymetrix has collaborated with scientists from academic research institutes and commercial seed companies to design arrays for a variety of plants including potato, soybean, strawberry, wheat, maize, and ornamental plants.

The Axiom® workflow provides automated genotype-calling software, eliminating tedious manual genotype assignment.



- Axiom® Software offers adaptive, dynamic clustering that employs statistical methods for accurate genotyping of diploid and polyploid species
- Axiom myDesign™ Custom Genotyping Arrays can be used for

affordable sequencing validation studies, whole-genome analysis, and routine genotyping for breeding purposes

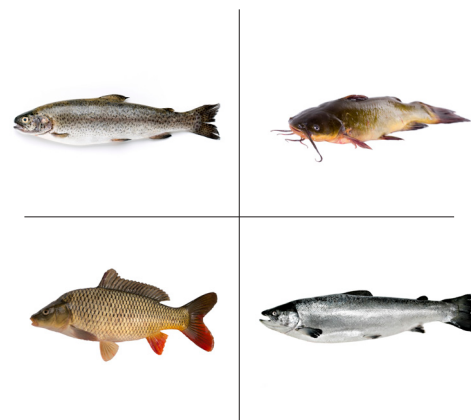


Clusters for polyploids are compressed and shifted off-center due to allele dosage contributions from the alternate sub-genomes.

## Aquaculture genotyping

Affymetrix has partnered with a number of aquaculture researchers, including Aqua Gen, Center for Integrative Genomics (CIGENE), USDA, and Landcatch, for complex trait research and genomic selection to improve breeding programs in a variety of aquaculture species such as catfish, carp, and trout.

- Axiom myDesign custom genotyping technology enables the design of SNP genotyping arrays for complex mosaic genomes, such as those of salmon
- Affymetrix data analysis software includes adaptable tools that can be applied to a variety of aquaculture species



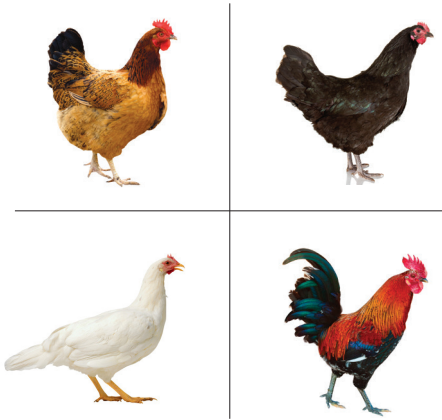
“Development of SNP arrays and automated genotyping in Atlantic salmon is complicated by the autotetraploid whole genome... The unparalleled design support and expertise from Affymetrix’ team of bioinformatics scientists helped tremendously to cope with these obstacles.”

### Dr. Sigbjørn Lien

Professor and Assistant Director  
Norwegian University of Life Sciences (UMB)  
and Centre for Integrative Genetics (CIGENE)

## Animal genotyping

Select from our catalog of high-density arrays



### Axiom® Genome-Wide Chicken Genotyping Array

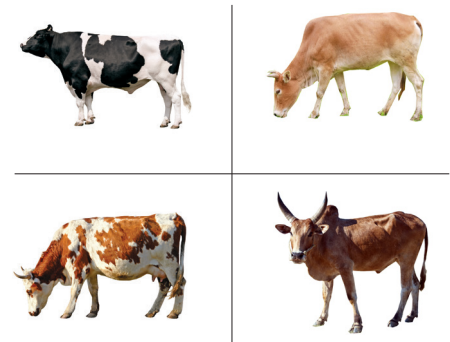
- Highest density chicken genotyping array that is available for public use, designed for broilers, white egg layers, brown egg layers, and outbred non-commercial breeds
- Designed in cooperation with the German Synbreed project funded by BMBF as part of a public-private partnership that includes BBSRC-funded LINK project between Roslin Institute, Aviagen Ltd, Hy-Line International, and Affymetrix.

“Results from blood on FTA cards were very good, call rates above 99%”

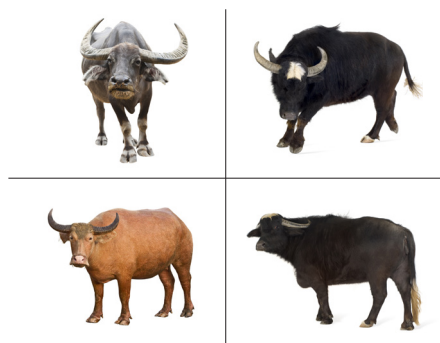
**Professor Dave Burt**  
The Roslin Institute  
University of Edinburgh, UK

### Axiom® Genome-Wide BOS 1 Bovine Genotyping Array

- Highest genomic coverage for *Bos taurus*, *Bos indicus* with more Zebu breeds and more usable SNPs for your application
- Developed in collaboration with 10 leading bovine researchers and Affymetrix' bovine knowledge database of 3 million genotype-tested SNPs
- An intelligent array that uses a SNP selection strategy based on haplotype blocks



Bovine image courtesy of Select Sires and Frank Robinson



### Axiom® Buffalo Genotyping Array

- Designed for a wide range of uses from complex trait research and molecular breeding to conservation and biodiversity
- Includes common and rare markers of the water buffalo (*B. Bubalis bubalis*)
- Multiple breeds represented — Mediterranean, Murrah, Jaffarabadi, and Nili-Ravi



# Axiom® myDesign™ Genotyping Arrays

Flexible, cost-effective, customized genotyping arrays

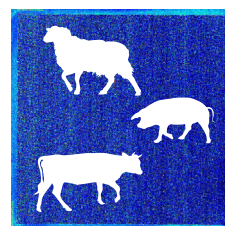
Affymetrix offers affordable custom genotyping arrays for individual researchers or consortia. Partner with our bioinformatics team to design arrays with relevant content for multiple applications from discovery to routine testing.

## Consistent supply and fast turnaround times

- Get 100% identical SNP content with every order and for as long as your research necessitates
- No SNP dropouts. All SNPs designed on the array are accessible every time

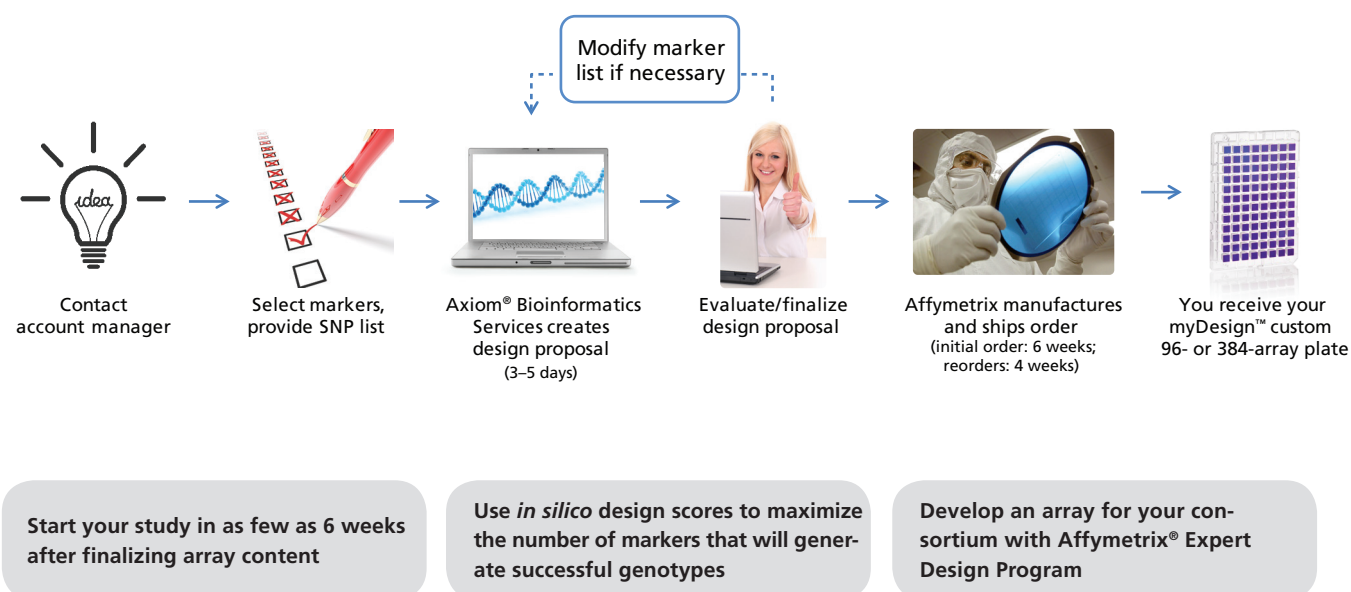
## Flexible formats

- Validate your sequencing SNP discovery with a screening array, then select the most informative SNPs to design an array for downstream routine high-throughput genotyping
- Include markers for multiple species on the same array
- Multiplex between 1,500–675,000 SNPs per array at an affordable price, and get more information for your investment



## Scalable

- Low sample commitment of 480 samples to fit your budget
- Reorder custom arrays for as few as 192 samples to complete your study



# Automated genotype-calling for diploids and polyploids

Streamline your workflow with expert bioinformatics support and user-friendly software

## Powerful statistics

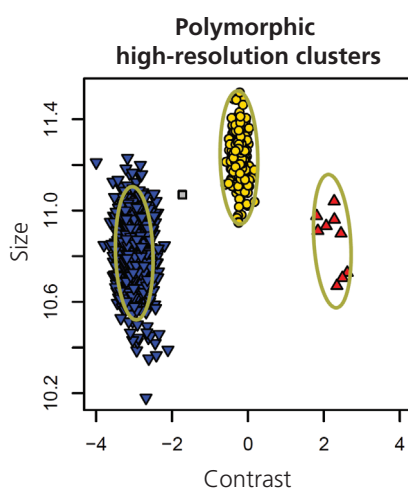
- Axiom® Software employs a statistical approach, FitAllo cluster prediction tool, which provides hints to accurately ascertain specific SNP cluster patterns in order to automatically assign correct genotypes
- AxiomGT1, the clustering and genotyping algorithm, features adaptive, dynamic clustering that employs statistical methods for accurate genotyping of diploid and polyploid species

## Seamless integration with your existing systems

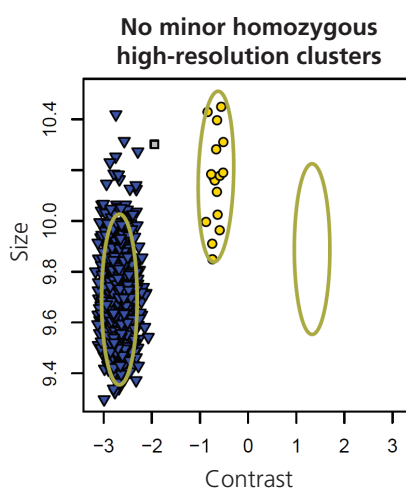
- Automation-friendly option: command line-based Affymetrix® Power Tools (APT)
- Integrates with third-party software packages
- Compatible with 32- and 64-bit Windows® 7 and Windows Server 2008 operating systems

## Multiple interpretation tools

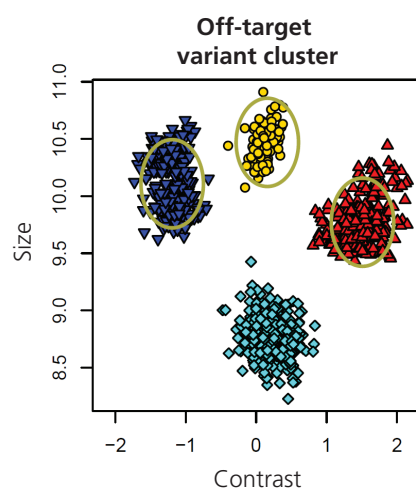
- Includes flexible SNP filtering and tools for exporting into PLINK format
- Visualization tools including scatter plots, line graphs, and heat map graphs
- SNPcluster classifies the SNPs into categories that enable you to assess the quality of the genotypes, as shown below



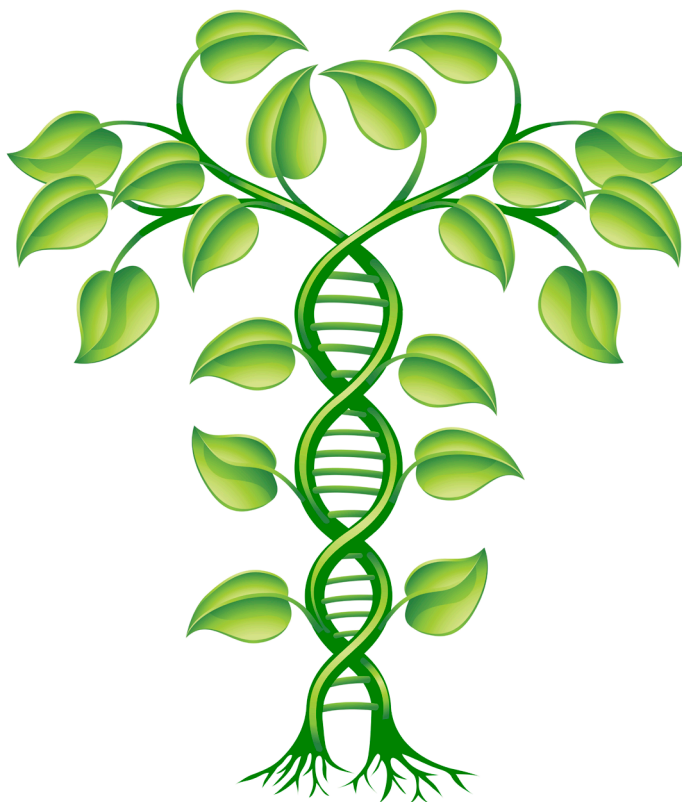
Good cluster resolution with at least 2 examples of the minor allele.



2 clusters with no examples of the minor allele.



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



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