

## Axiom<sup>®</sup> Genome-Wide Chicken Genotyping Array

Highest density array for genotyping layers and broilers across multiple breeds



Axiom<sup>®</sup> Genome-Wide Chicken Genotyping Array is the first commercially available high-density chicken genotyping array. This array includes hundreds of thousands of polymorphic markers that are present in commercial layers and broilers and outbred non-commercial populations.

Benefits of Axiom Genome-Wide Chicken Genotyping Array include:

- Only chicken genotyping array openly available as a catalog product allowing effective data sharing
- Enables variation detection both within and between poultry breeds in broilers, white egg layers, brown egg layers and outbred non-commercial breeds
- 580,961 highly polymorphic genetic variants chosen from a screening of 1.8M markers
- Designed in collaboration with leading academic institutions and commercial poultry companies that include The Roslin Institute, Aviagen Ltd, Hy-Line International, and the German Synbreed project

### Wide range of applications

Axiom Chicken Genotyping Array can be used for predicting breeding values in both layers and broilers, for genome-wide association studies, high resolution genetic mapping, Mendelian trait mapping and selection signature analysis. The parental high-density information from the array can be used to make decisions on breeding poultry to gain incremental improvements in feed conversion ratio, growth rate, saleable eggs, white meat yield and understanding inheritance traits across and within multiple breeds. Axiom Chicken Genotyping Array also contains markers associated with wild outbred

lines that can be useful in conducting functional studies and observing phenotypic effects across outbred and crossbred lines for better management of indigenous chickens as well as for studying genetic diversity among populations.

### Maximum coverage of genetic diversity

SNP discovery was carried out by resequencing 243 chickens from 24 lines representing both elite commercial and experimental lines as shown in Table 1. Sequencing data was aligned to the reference genome Gallus\_gallus-4.0.

**Table 1:** Description of sequenced individuals.

Breed	Type	Breed description (number of breeds)	Number of individuals/breed
Aviagen	Broiler	Commercial (4)	10
HyLine	Layer	Commercial (8)	10
Synbreed	Layer	Commercial (3)	3 from one line 15 from two lines
IAH Line	Layer	Inbred experimental (8)	10
J. Line Roslin	Layer	Non-selected, experimental (1)	10

### Array design

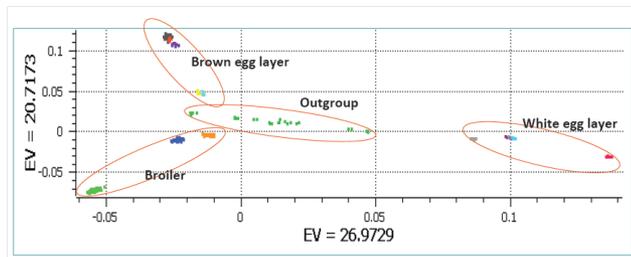
The SNPs discovered through resequencing were genotype tested on the Axiom genotyping platform by screening 1.8M SNPs across 300 samples that included 186 commercial lines, wild out-group samples and 32 parent offspring trios for Mendelian inheritance.

Markers were selected for inclusion on Axiom Genome-Wide Chicken Genotyping Array based on the following criteria:

- Markers exhibited a range of minor allele frequencies to ensure representation of both rare and common variants
- Markers were uniformly distributed across the genome in layers and broilers
- Greater than 98% call rate across tested samples
- Markers exhibited Mendelian inheritance; highly polymorphic markers were prioritized
- Annotation information was available for defining the effect of the selected variants

The Principal Component Analysis (PCA) shows that markers for layers, broilers and out-group lines can group the closely related individuals demonstrating the success of SNP selection criteria.

**Figure 1:** PCA analysis of markers showing closely related individuals grouped together.



### Superior performance

Axiom® Genome-Wide Chicken Array is part of the Axiom® Genotyping Solution, which generates robust and reliable genotypes with minimal user intervention while reducing costs and processing complexity. Three hundred customer samples representing commercial and experimental lines were genotyped on the array. The samples were prepared with manual target preparation and processed on the GeneTitan® MC Instrument. Array performance was measured across 559,249 SNPs. The SNPs were filtered as per the *Best Practice Supplement to Axiom*

*Genotyping Solution Data Analysis* (P/N 703083). The results are summarized in Table 2.

**Table 2:** Genotyping performance on commercial samples.

Metric	Specification	Customer sample performance
Sample pass rate	>95%	98.03%
Average sample call rate	>98%	99.79%
Reproducibility	>99%	99.91%
Autosomal Mendelian error	<0.3%	0.1%

### Sample types supported

- Blood on FTA cards
- Blood

### Genomics presentations

Gheyas A. A., *et al.* Development and characterization of a high-density SNP genotyping assay for the chicken. *The Roslin Institute, University of Edinburgh*. Poster presentation at The Plant and Animal Genome Conference, San Diego, CA, USA (2012).

### Ordering information

Part number	Product name	Description
902148	Axiom® Genome-Wide Chicken Array Kit	Contains <ul style="list-style-type: none"> <li>▪ One Axiom® 96-array plate</li> <li>▪ GeneTitan® Instrument consumables</li> <li>▪ One Axiom® 2.0 Reagent Kit</li> </ul>

Affymetrix, Inc. Tel: +1-888-362-2447 ■ Affymetrix UK Ltd. Tel: +44-(0)-1628-552550 ■ Affymetrix Japan K.K. Tel: +81-(0)3-6430-4020  
Panomics Solutions Tel: +1-877-726-6642 panomics.affymetrix.com ■ USB Products Tel: +1-800-321-9322 usb.affymetrix.com

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