Data Sheet

Affymetrix®
Revolutionize life

Axiom™ Genome-Wide BOS 1 Array Plate

Highest genetic coverage for accurate trait selection

The Axiom™ Genome-Wide BOS 1 Array Plate features the highest genetic coverage of 10 commercially important cattle breeds of any microarray on the market, enabling accurate genetic merit evaluations, genome-wide association studies to identify variations associated with disease, drug response, and other economically important traits, as well as biodiversity research and linkage disequilibrium (LD) studies.

Benefits of the Axiom Genome-Wide BOS 1 Array Plate:

- **Up to 34 percent higher genetic coverage than any array on the market**
- **The broadest coverage of beef and dairy breeds**
- **Designed and priced with breeders in mind**
- **Built from a database of 3 million validated single nucleotide polymorphisms (SNPs) for reliable results**
- **Developed in collaboration with 10 leading bovine researchers**

The array is designed to maximize genetic and physical SNP coverage of both *Bos taurus* and *Bos indicus* breeds. The array covers more than 640,000 SNP markers representing the genetic diversity of approximately 3 million SNPs from the Affymetrix® Bovine Genomic Database.

Unique design process maximizes genetic coverage

The Axiom Genome-Wide BOS 1 Array Plate was designed in conjunction with the Affymetrix Bovine Consortium using a unique design process to obtain the highest genetic coverage of 10 cattle breeds using the fewest number of SNPs.

First, more than 46 million SNPs were discovered by sequencing genomic DNA from a variety of *B. taurus* and *B. indicus* breeds, including East Asian, tropically adapted, beef, and dairy breeds. SNPs were then filtered based on physical coverage of the *Bos* genome and the number of breeds in which the SNPs were observed.

Next, approximately 3 million SNPs across 20 breeds were validated* by genotyping approximately 400 samples on multiple arrays (Table 1). Half of the screened samples were

Table 1: Number of polymorphic SNPs in 20 cattle breeds contained in the Affymetrix Bovine Genomic Database.

Breed	No. of polymorphic SNPs (millions)
Afrikander	1.4
Angus	1.4
Ayrshire	0.96
Blonde d'Aquitaine	0.99
Boran	2.2
Brahman	2.4
Brown Swiss	0.99
Simmental	1.4
Gir	2.1
Hanwoo	1.3
Hereford	1.2
Holstein	1.6
Japanese Black	1.1
Jersey	1.2
Limousin	1.4
Nelore	2.3
Norwegian Red	1.0
Rouge des Prés	0.7
Romagnola	1.6
Tuli	1.4

* Validated SNPs are SNPs that are polymorphic in the 20 breeds in Table 1 and those that demonstrate high performance on the Axiom Genotyping Assay.

Figure 1: Genetic SNP selection optimizes genetic coverage.

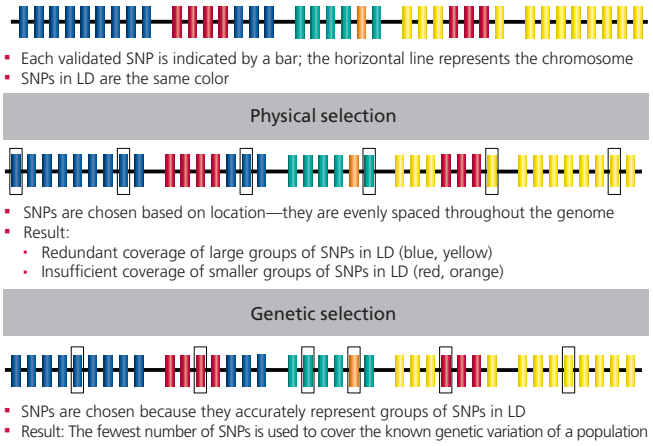
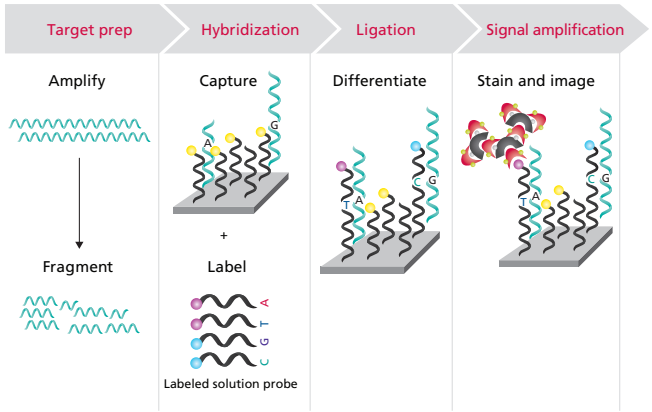


Figure 2: The Axiom biochemical assay.



derived from the Bovine HapMap Consortium and the other half were derived from the Affymetrix® Bovine Consortium.

SNPs were chosen based on genetic selection because this method minimizes redundant coverage of large groups of SNPs in LD and maximizes coverage of smaller groups of SNPs in LD for more efficient and cost-effective genotyping. Figure 1 illustrates the difference between genetic and physical selection of SNPs.

The final array contains more than 640,000 SNPs that maximize genetic coverage in the Holstein, Angus, Nelore, and related breeds (Table 2). For most breeds, genetic coverage is greater than or equal to 90 percent.

The content of the array encompasses SNPs within coding sequences (CDS), splicing sites, and untranslated regions (UTR), as shown in Table 3.

High-performance data derived from validated SNPs

SNPs were selected for the array based on genotyping reproducibility and call rate, with accuracy confirmed by analysis of Mendelian inheritance. Array performance metrics are shown in Table 4.

The Axiom™ Genotyping Assay

The Axiom™ Genome-Wide BOS 1 Array Plate is part of the Axiom Genotyping Solution, which utilizes a ligation-based assay with a two-color readout (Figure 2). This assay exploits the selectivity of ligation to resolve genotypes subsequent to the amplification of an entire genome via hybridization to an oligonucleotide array, in cases where hybridization alone may be insufficient.

The Axiom Genotyping Assay and Axiom Genome-Wide BOS 1 Array Plate have been successfully used with blood, semen, ear punch, and hair bulb samples from cattle.

Table 2: The Axiom Genome-Wide BOS 1 Array Plate provides superior genetic coverage of 10 commercially important breeds and associated genetic coverage metrics. Blue denotes *B. indicus* and green denotes *B. taurus*.

Genetic coverage for each breed (%)										
SNP selection strategy	Holstein*	Angus	Nelore	Jersey*	Fleckvieh	Hereford	Limousin	Romagnola	Brahman	Gir**
Axiom Genome-Wide BOS 1 Array	98.1	98.8	87.4	96.9	91.2	95.4	88.4	92.5	78.8	80.8
Physical SNP selection	80	88	65	93	83	90	79	87	67	69

Taurine Indicine *Dairy breeds **Dairy and beef

Table 3: Total number of SNPs from each class on the Axiom™ Genome-Wide BOS 1 Array Plate.

Type of SNP*	Number of validated SNPs
Exon CDS – non-synonymous	7,504
Exon CDS – synonymous coding	11,543
Exon – UTR	8,014
Exon – other	2,965
Splicing site	51
Intron	184,253
Other	404,024

*CDS = coding sequences; UTR = untranslated regions.

Table 4: Axiom™ Genome-Wide BOS 1 Array Plate performance.*

Number of SNPs	648,855
Number of validated SNPs†	618,345
Sample pass rate	99.94%
Average sample call rate	99.62%
Reproducibility‡	99.94%
Mendelian consistency	99.96%

* For blood, semen, ear punch, and hair bulb samples from all 20 breeds shown in Table 1.

† These SNPs are polymorphic and pass performance criteria for all the breeds and samples tested. Additional SNPs may be validated on a per-breed basis. These SNPs were used for sample performance and coverage calculations.

‡ Reproducibility of SNP calls are for replicates run on different plates.

Specifications

Number of SNPs on the array	648,855
Number of features	1,416,000
Number of probes per SNP	2 or more
DNA required	200 ng
Instrumentation	GeneTitan® Multi-Channel Instrument
Throughput	768 samples per week per instrument using one Beckman Biomek® FXᴾ Target Prep Express

Ordering information

Part number	Description
Axiom™ Genome-Wide BOS 1 Array Plate Genotyping Bundle 1	
901791	Contains: ▪ One Axiom™ 96-Array Plate ▪ GeneTitan® Instrument Consumables* ▪ One Axiom™ 2.0 Reagent Kit

*One hybridization tray, one scan tray, and five stain trays with covers are included with each array plate. These consumables are required for processing Axiom™ Array Plates on the GeneTitan® Multi-Channel Instrument.

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