

Supplementary Information

An integrated allele-specific polymerase chain reaction-microarray chip for single nucleotide polymorphism typing

Jong Young Choi^a, Yong Tae Kim^a, Ju-Young Byun^b, Jinwoo Ahn^c, Soyi Chung^a, Dae-Gab Gweon^c, Min-Gon Kim^d and Tae Seok Seo^{*a}

^a Department of Chemical and Biomolecular Engineering (BK21 Program) and KAIST Institute for the BioCentury, Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Korea. Fax: +82 42 350 3910; Tel: +82 42 350 3973; E-mail: seots@kaist.ac.kr

^b Department of Fine Chemical Engineering and Applied Chemistry, Chungnam National University, Daejeon 305-764, Korea

^c Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Korea

^d Department of Photonics and Applied Physics, Gwangju Institute of Science and Technology (GIST), Gwangju 500-712, Korea

Table S1 Allele frequency of the beef cattle based on the MassARRAY analysis

Gene ¹	SNP No.	Genotype	Allele frequency for target sequences	
			HW ² group (total 606 heads tested)	IBC ³ group (total 384 heads tested)
Hapmap40677-BTA-121871	1	C/C	545	68
		T/C	57	148
		T/T	4	166
		No call	0	2
		Target (T)	0.101	0.822
UA-IFASA-4798	2	C/C	565	97
		T/C	41	157
		T/T	0	129
		No call	0	1
		Target (T)	0.068	0.747
BFGL-NGS-111691	3	G/G	581	80
		T/G	25	166
		T/T	0	138
		No call	0	0
		Target (T)	0.041	0.792
Hapmap57340-rs290100501	4	G/G	578	121
		A/G	28	183
		A/A	0	80
		No call	0	0
		Target (A)	0.046	0.685
ARS-BFGL-NGS-20015	5	G/G	546	88
		A/G	54	187
		A/A	1	109
		No call	5	0
		Target (A)	0.092	0.771
ARS-BFGL-NGS-84649	6	G/G	555	130
		A/G	48	179
		A/A	2	75
		No call	1	0
		Target (A)	0.083	0.661
Hapmap39562-BTA-40351	7	C/C	553	111
		A/C	50	174
		A/A	3	99
		No call	0	0
		Target (A)	0.087	0.711
ARS-BFGL-NGS-19963	8	G/G	550	68
		A/G	48	71
		A/A	6	243
		No call	2	2
		Target (A)	0.089	0.822
UA-IFASA-4800	9	C/C	576	72
		T/C	30	176
		T/T	0	135
		No call	0	1
		Target (T)	0.050	0.812
Hapmap48920-BTA-84063	10	G/G	552	128
		A/G	54	171
		A/A	0	84
		No call	0	1
		Target (A)	0.089	0.666

¹ References for the bovine reference genome

² Hanwoo; ³ Imported beef cattle

Table S2 Primer sequences used for MassARRAY analysis

SNP No. or Gene ¹	SNP No.	Primer sequence (5' to 3')	Probe sequence (5' to 3')
Hapmap40677 -BTA-121871	1	F: ACGTTGGATGAGGGACATAAAGAGACCACG R: ACGTTGGATGGTGGTAATGATGAGAGCTCC	AATGATGAGAGCTCCAGGTAC
UA-IFASA -4798	2	F: ACGTTGGATGATCAGAAAGGGCCAAACTGC R: ACGTTGGATGAGGAGGAGGAACACCATCA	AGGAACACCATCAAGCAAG
BFGL-NGS -111691	3	F: ACGTTGGATGGGATTTGGGCTTGTTTCATGG R: ACGTTGGATGGAAGAACTGAGCACAGCATC	ATCTGGTTTTGGGGCCCCTT
Hapmap57340 -rs29010501	4	F: ACGTTGGATGGGCTCCTATAGTTCCAAGAG R: ACGTTGGATGACTTGCCAGTGGAATTCTGG	GGAATTCTGGGCAGAAAG
ARS-BFGL -NGS-20015	5	F: ACGTTGGATGTTTGCAACACTGGTCCCAAC R: ACGTTGGATGAGAGGGATTTGGGAGTTCTG	GGAGTTCTGGGGATGGAGG
ARS-BFGL -NGS-84649	6	F: ACGTTGGATGCTTTCTTTTGGCTGTGCCG R: ACGTTGGATGGACAAGAGAAGCCACTACAG	AGTGAGAAGCCCGTGTGCC
Hapmap39562 -BTA-40351	7	F: ACGTTGGATGGAAATGTCATTGTCCTAGTG R: ACGTTGGATGTGTTTCTAGGTCTCTCTCCC	TCATGGGGTGAATCTGATTT
ARS-BFGL -NGS-19963	8	F: ACGTTGGATGTGGGCCACTGTTTGCTTATC R: ACGTTGGATGCCTTCCAGTGAATATCCAGG	TGCTTATAAAAATGATACTCCT
UA-IFASA -4800	9	F: ACGTTGGATGGGTGAAATACTGGTGCTCTC R: ACGTTGGATGGATGGCCACTTCTAATGCTA	GGATGAGAACTCAGT
Hapmap48920 -BTA-84063	10	F: ACGTTGGATGACTGACAGTTCCTTTTGGTG R: ACGTTGGATGTGTCTTGAGCAAAAGAGGAG	AGCTAGCCAATACCAAG

¹ References for the bovine reference genome

Table S3 Capture probe sequences spotted on the microarray slide

SNP No.	Probe sequence ¹ (5' to 3')
MDH2	TTTTTTTTTTTTTTGAAGAAGCGAAAGCGGCTGC
1	TTTTTTTTTTTTTTTAAAGAGACCACGTCAGAGGC
2	TTTTTTTTTTTTTTTGGATGGTAAAGCTTGTTTATTAA
3	TTTTTTTTTTTTTTTTTTGGGCTTGTTTCATGGACCC
4	TTTTTTTTTTTTTTTTTGATCATCAAACCTCAGAGACTCA
5	TTTTTTTTTTTTTTTTTGATGCAGGTGGACTGTTTGC
6	TTTTTTTTTTTTTTTTTGACCACCGGGGAAGTCCC
7	TTTTTTTTTTTTTTTTTGATGTCTAGGATGGACAATGG
8	TTTTTTTTTTTTTTTTTAGTCAGTTCTTCACATCAGG
9	TTTTTTTTTTTTTTTTTGGTACTTTCAGGATCTCTTC
10	TTTTTTTTTTTTTTTTTGCCTGGAGAATCCCCATGGA

¹ Amine modified at the 5' end of each primer

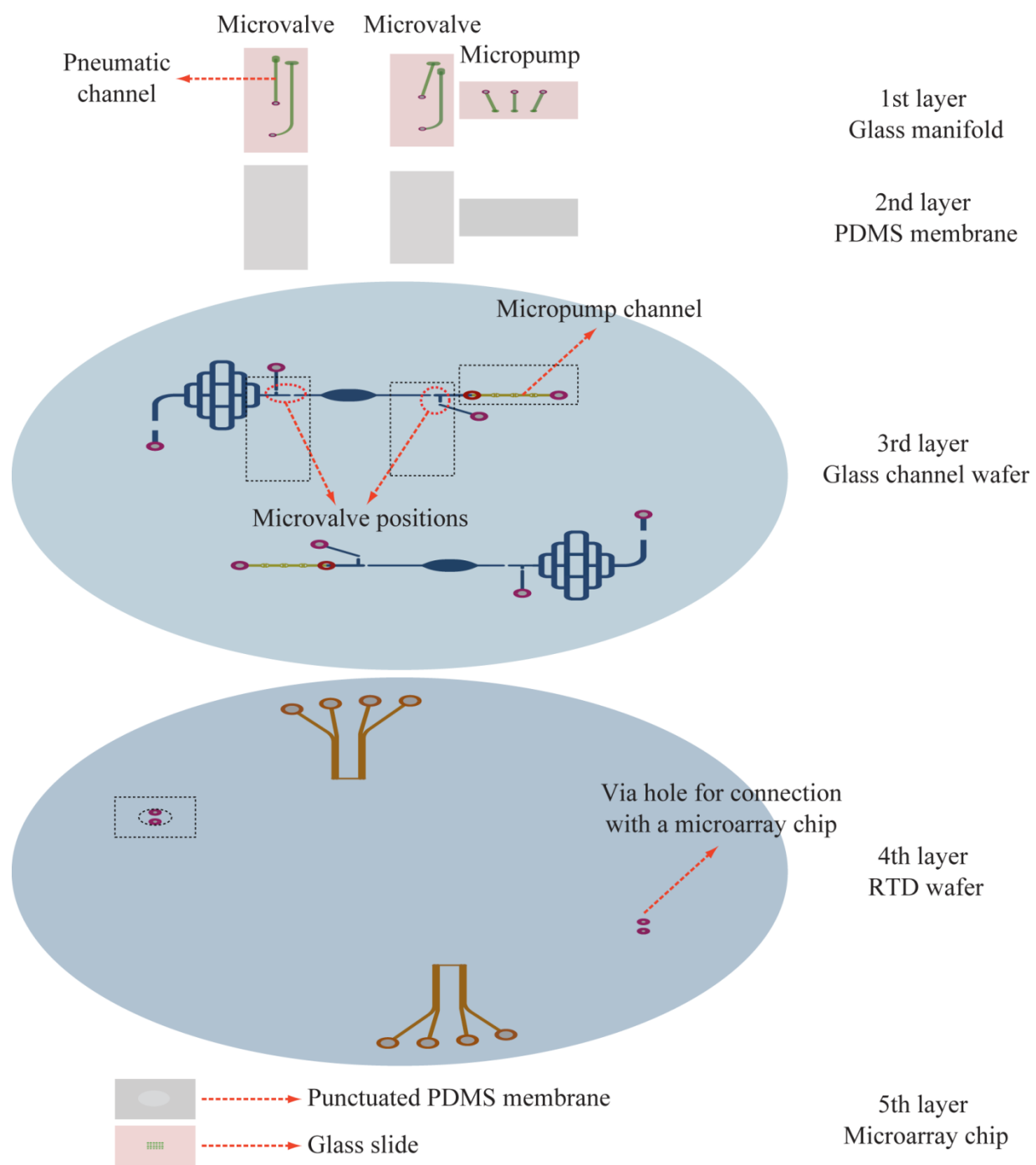


Fig. S1 Schematic illustration of the AS PCR-microarray chip consisting of 5 layers from top to bottom: a glass manifold, a PDMS membrane, a glass channel wafer, an RTD glass wafer, and a microarray chip.

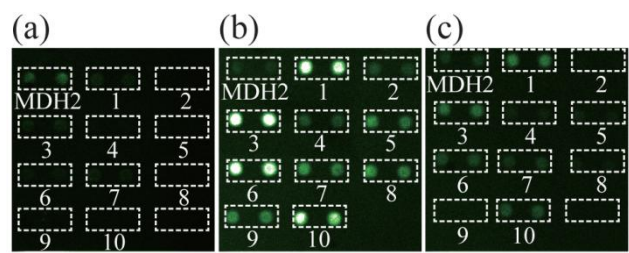


Fig. S2 Blind tests using an integrated AS PCR-microarray genetic analysis microsystem. (a) Hanwoo; (b) Imported beef cattle; (c) Imported beef cattle. The blind samples were correctly identified as (a) Hanwoo by showing only one positive control fluorescence signal, while the imported beef cattle revealed (b) eleven or (c) six ones.