



## Genome Wide Association Studies Using Multiple-lactation Breeding Value in Holsteins

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### - Supplementary Data -

**Supplementary Table S1.** Genome-wide significant SNPs with milk fat yields

	Chr.	Position	P-value for milk yield			
			Lactation 1	Lactation 2	Lactation 3	Lactation 4
ARS-BFGL-NGS-60312	2	62265739	*4.30E-07	6.27E-06	3.33E-05	9.80E-05
ARS-BFGL-NGS-36544	2	65415110	*2.00E-08	*4.20E-07	2.49E-06	8.72E-06
ARS-BFGL-NGS-33412	2	65469391	*2.00E-08	*4.20E-07	2.49E-06	8.72E-06
ARS-BFGL-NGS-55238	2	65513882	*5.00E-08	*9.50E-07	5.32E-06	1.74E-05
<sup>a</sup> BTB-01536920	2	68514758	*1.70E-07	2.25E-06	6.33E-06	1.52E-05
ARS-BFGL-NGS-95316	2	70485741	*4.00E-07	*2.40E-07	*5.10E-07	*1.11E-06
<sup>a</sup> ARS-BFGL-NGS-35056	2	92080445	2.78E-06	*1.04E-06	*7.60E-07	*1.15E-06
Hapmap58492-rs29016957	16	64731044	*6.40E-07	3.64E-05	1.43E-04	3.48E-04
ARS-BFGL-NGS-104238	19	50336021	*3.30E-07	3.73E-05	1.86E-04	6.55E-04
ARS-BFGL-NGS-73980	19	51419352	*4.10E-07	2.38E-06	9.30E-06	3.27E-05
Hapmap42556-BTA-45815	19	51445450	*4.10E-07	2.38E-06	9.30E-06	3.27E-05
<sup>a</sup> ARS-BFGL-NGS-21956	21	23068300	1.17E-03	8.11E-06	*6.10E-07	*3.20E-07
Hapmap35708- SCAFFOLD316799_27843	21	25136856	1.51E-03	8.14E-06	*1.02E-06	*5.20E-07

\* : significant SNPs ( P-value < 1.22E-06 )

a : Shadowed SNPs are significant for different traits as well ( Protein yield )

**Supplementary Table S2.** Genome-wide significant SNPs with milk protein yields

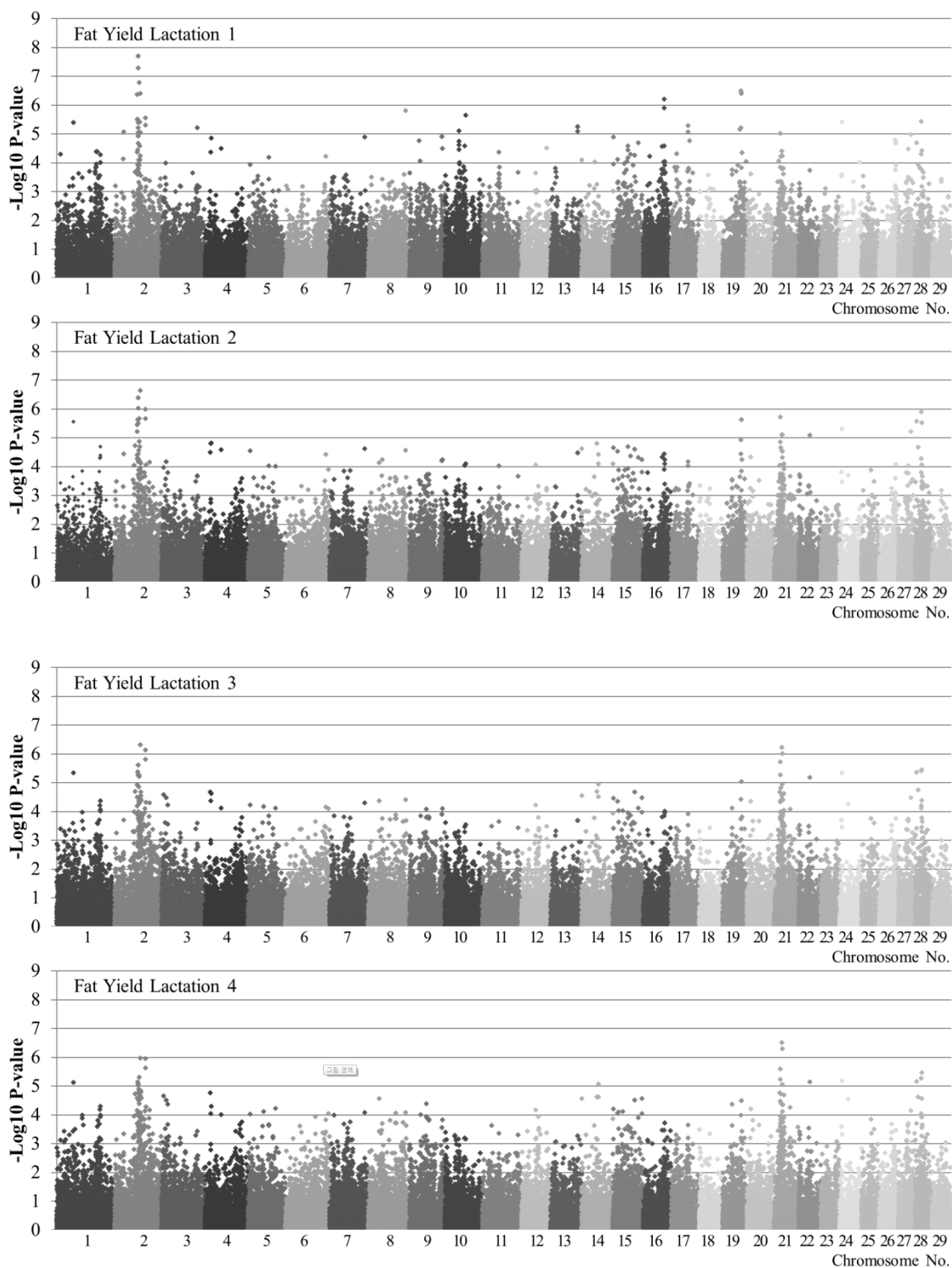
	Chr.	Position	P-value for milk yield			
			Lactation 1	Lactation 2	Lactation 3	Lactation 4
BTA-79216-no-rs	1	36119886	2.61E-06	2.16E-06	*1.12E-06	*7.60E-07
Hapmap50474-BTA-79209	1	36267086	4.24E-06	*1.16E-06	*7.10E-07	*5.20E-07
ARS-BFGL-NGS-102253	2	62853776	3.09E-06	*8.00E-07	4.81E-06	5.81E-06
<sup>a</sup> BTB-01536920	2	68514758	*1.09E-06	1.59E-06	1.99E-06	1.40E-06
ARS-BFGL-NGS-53141	2	91895929	*1.19E-06	*3.20E-07	*6.80E-07	*5.30E-07
<sup>a</sup> ARS-BFGL-NGS-35056	2	92080445	*7.80E-07	*1.70E-07	*3.80E-07	*2.90E-07
BTA-20822-no-rs	3	100584312	*3.20E-07	5.53E-06	8.85E-06	4.33E-06
Hapmap49746-BTA-76106	6	46140090	*1.20E-07	*4.70E-07	4.74E-06	3.65E-06
ARS-BFGL-NGS-1647	8	61356475	6.22E-05	*4.40E-07	*2.70E-07	*3.50E-07
Hapmap49339-BTA-84110	9	71162153	*1.00E-07	1.54E-05	1.83E-05	6.58E-06
Hapmap43513-BTA-21673	12	45135480	*2.90E-07	*8.20E-07	2.46E-06	1.74E-06
ARS-BFGL-NGS-94706	14	1696470	1.25E-05	*6.00E-07	*2.60E-07	*1.70E-07
BTA-41828-no-rs	17	2748831	*9.60E-07	1.27E-04	2.40E-04	9.69E-05
Hapmap52387-rs29021226	17	10594226	*9.30E-07	1.50E-03	1.01E-02	4.96E-03
<sup>b</sup> BTB-01440888	17	11049283	*2.30E-07	8.68E-05	3.27E-04	1.43E-04
ARS-BFGL-NGS-8026	17	11933243	*8.10E-07	1.95E-05	2.86E-05	1.30E-05
<sup>b</sup> ARS-BFGL-NGS-22135	17	13800376	*8.30E-07	4.79E-04	3.63E-03	2.25E-03
Hapmap47979-BTA-51767	21	19267278	4.69E-05	1.31E-06	1.24E-06	*9.90E-07
ARS-BFGL-NGS-103603	21	19312826	*8.00E-07	*1.50E-07	*2.00E-07	*1.70E-07
ARS-BFGL-NGS-40408	21	19792546	2.38E-06	*8.90E-07	*9.10E-07	*5.30E-07
ARS-BFGL-BAC-33343	21	19832171	*3.40E-07	*2.00E-08	*1.00E-08	*1.00E-08
Hapmap47651-BTA-51810	21	19983053	2.15E-06	*5.50E-07	*1.30E-07	*6.00E-08
ARS-BFGL-NGS-11578	21	22898102	*5.10E-07	*2.20E-07	*2.20E-07	*1.40E-07
<sup>a</sup> ARS-BFGL-NGS-21956	21	23068300	3.13E-04	2.17E-06	*2.10E-07	*1.60E-07
ARS-BFGL-NGS-56762	21	23486322	*1.50E-07	*1.13E-06	*1.19E-06	*4.80E-07
BTA-51937-no-rs	21	26026944	*8.20E-07	*6.00E-08	*4.00E-08	*3.00E-08
<sup>b</sup> ARS-BFGL-NGS-101670	24	24873093	6.61E-06	*2.00E-08	*2.01E-09	*2.22E-09
BTA-20879-no-rs	28	16975360	*6.70E-07	*1.05E-06	*8.40E-07	*3.90E-07

\* : significant SNPs ( P-value < 1.22E-06 )

a : Shadowed SNPs are significant for different traits as well ( Fat yield )

b : Shadowed SNPs are significant for different traits as well ( Milk yield )

**Supplementary Figure S1.** Manhattan plots of association significance for milk fat yields by lactation



**Supplementary Figure S2.** Manhattan plots of association significance for milk protein yields by lactation

