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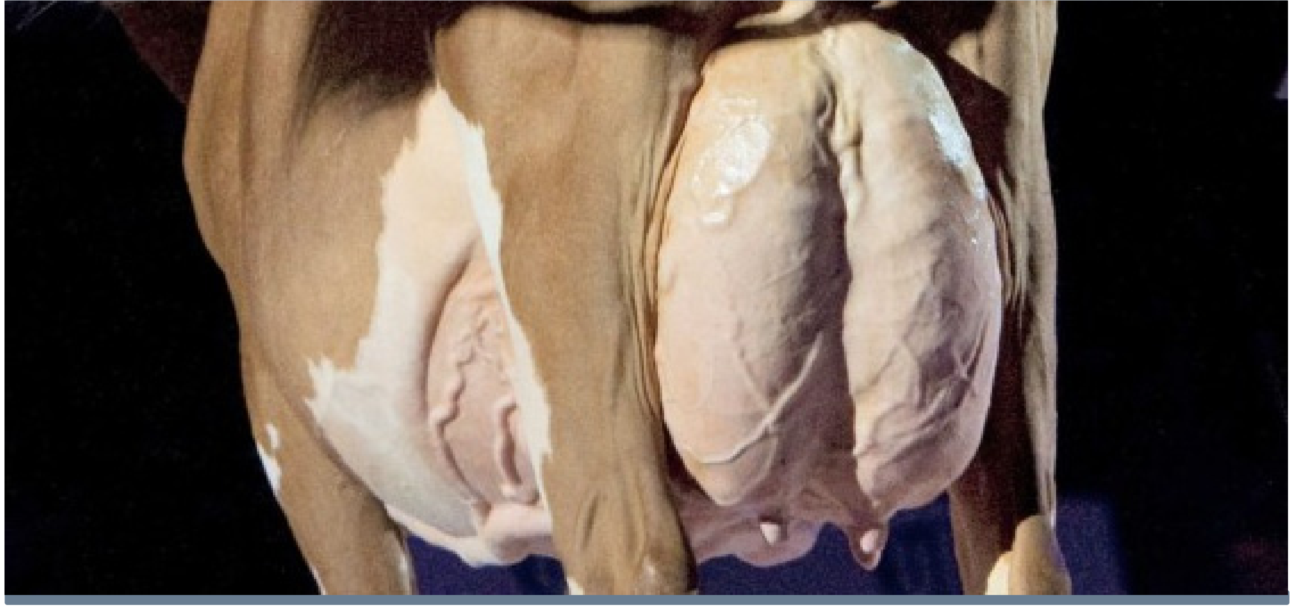

A genome-wide association study (GWAS) of supernumerary teats in Red Holstein cattle

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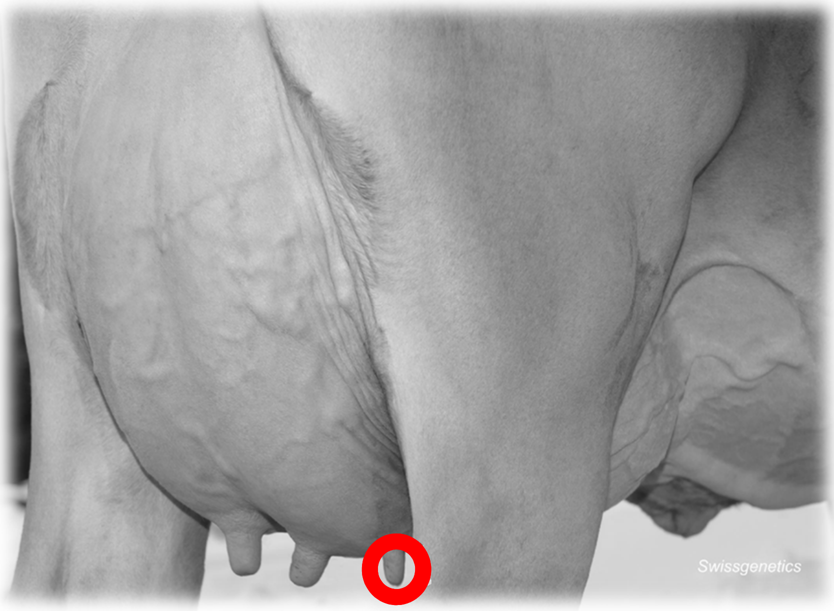
Supernumerary (extra) teats



intercalary

caudal

with or **without** mammary gland

Machine milking ability

European Champions

Phenotypes

1’079 Red Holstein bulls

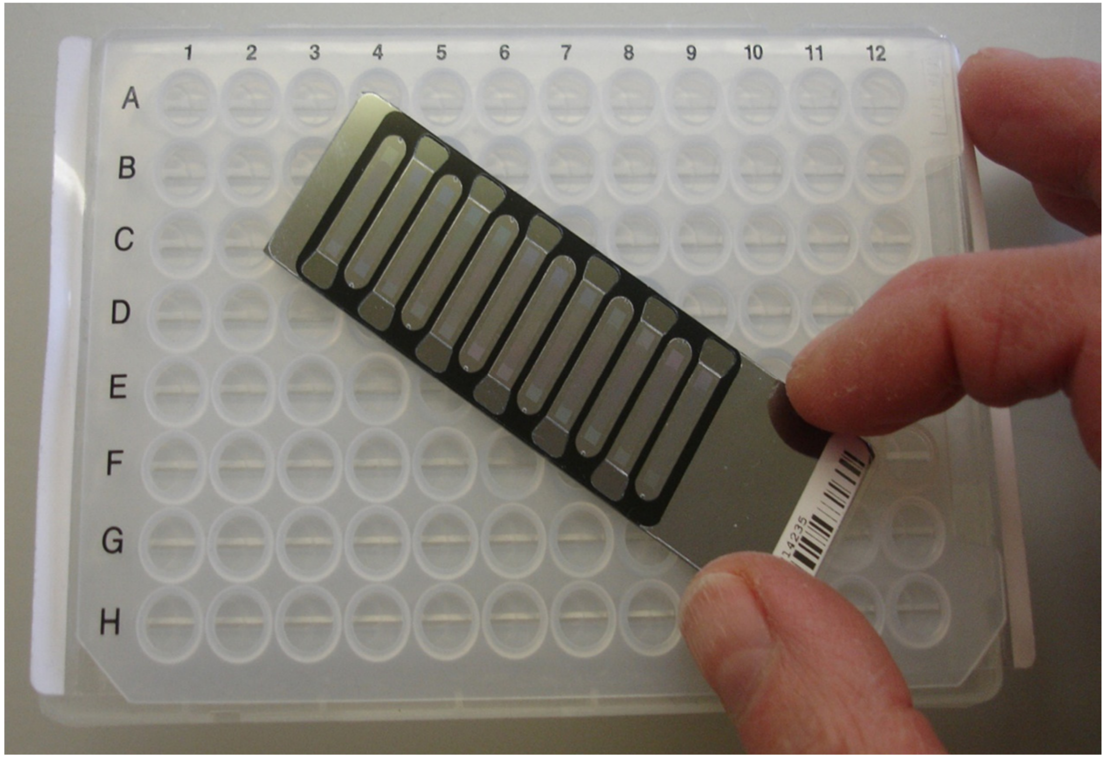
% of daughters with **caudal** supernumerary teats **without** mammary gland

% of daughters with **caudal** supernumerary teats **with** mammary gland

% of daughters with **intercalary** supernumerary teats **without** mammary gland

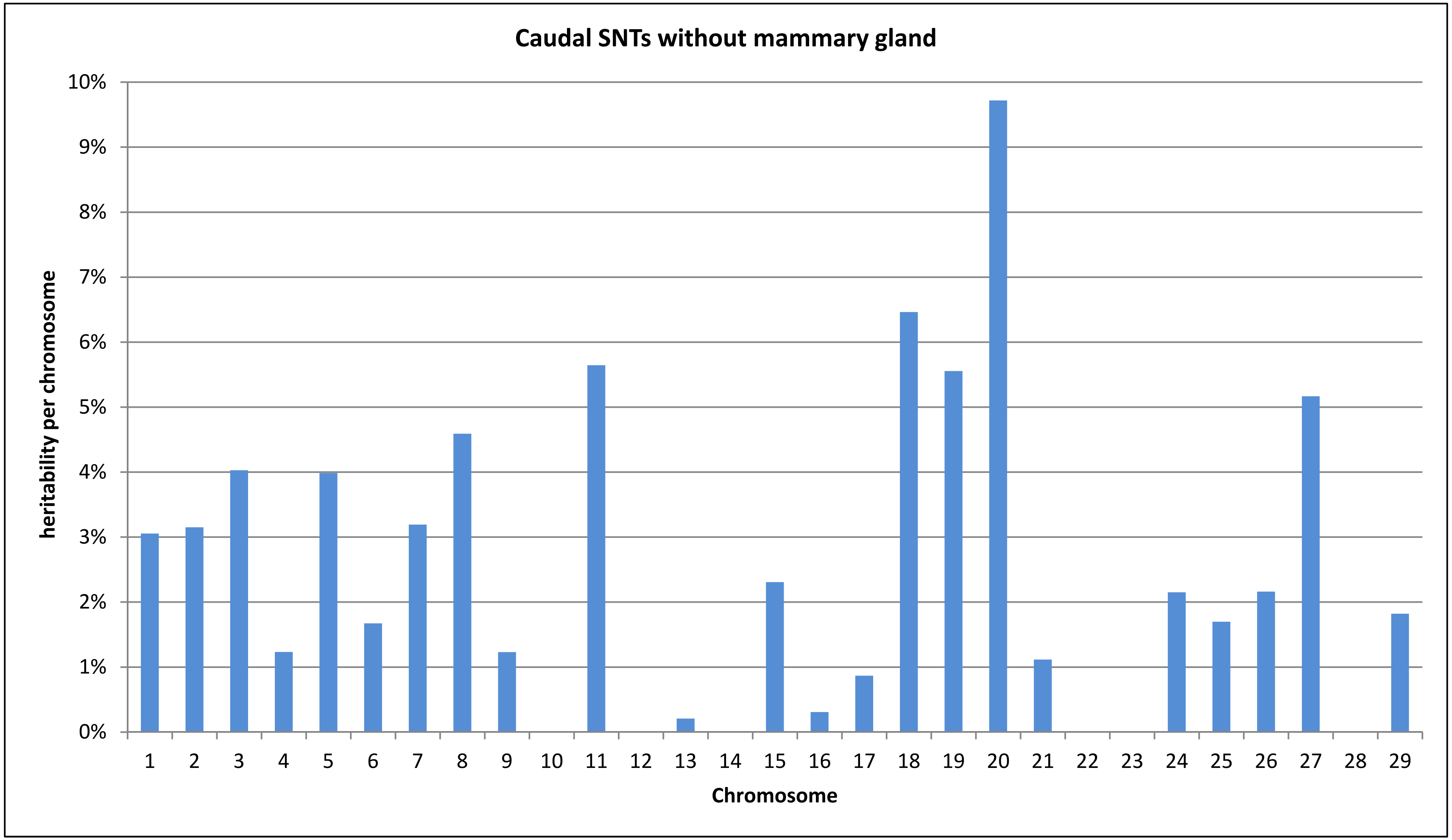
247’522 daughters

Genotypes

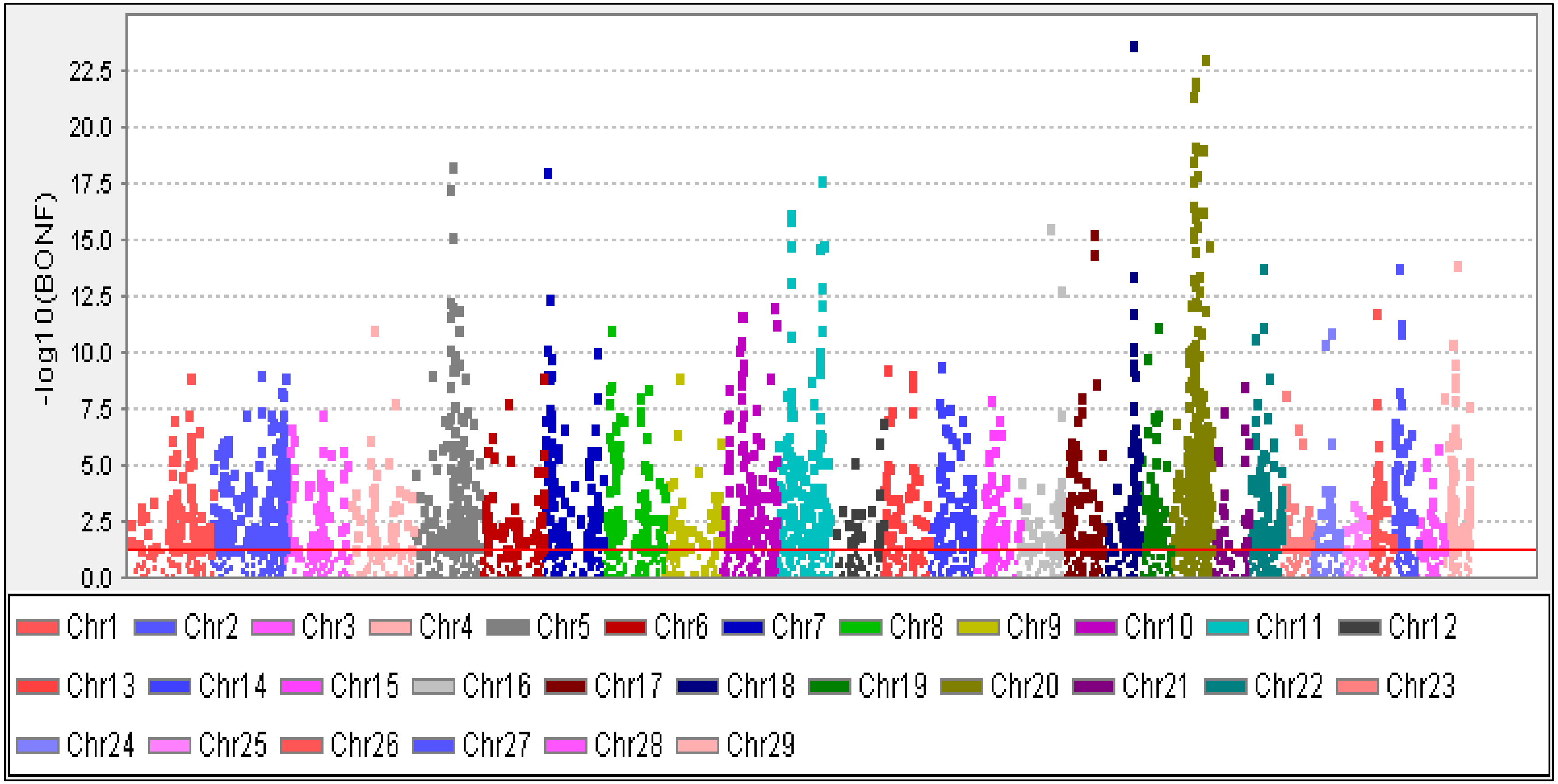


50’733 SNPs
out of 54’001

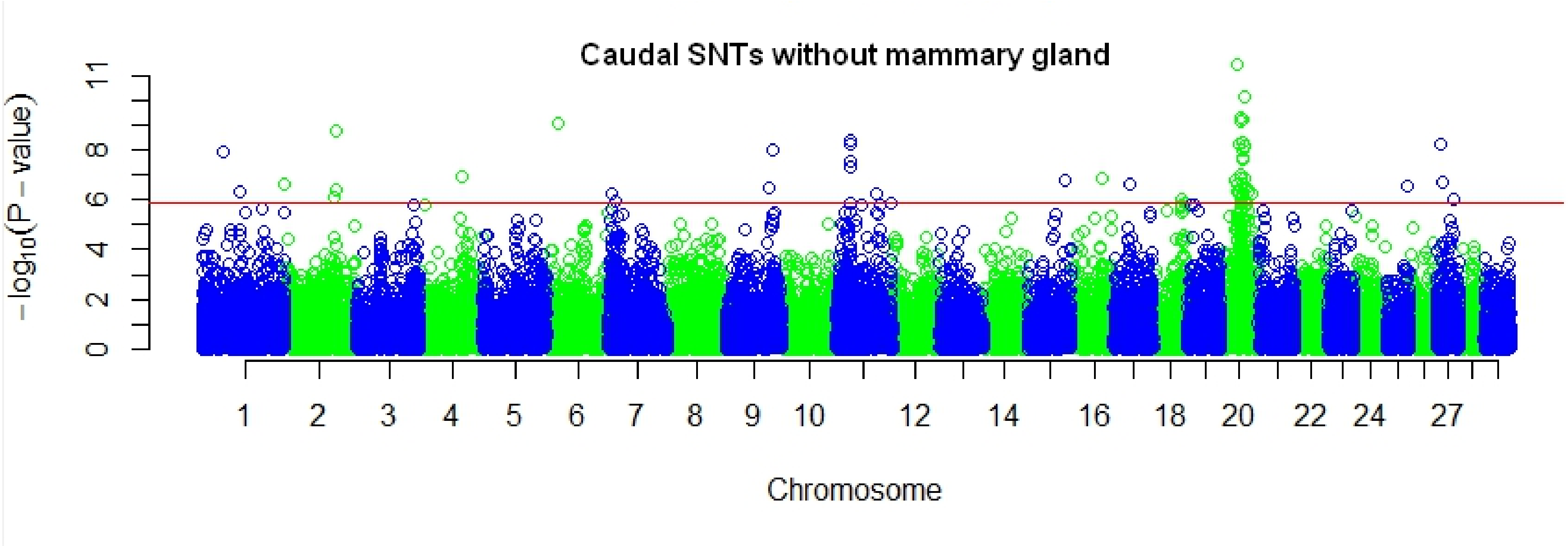
Genome-wide Complex Trait Analysis (GCTA)



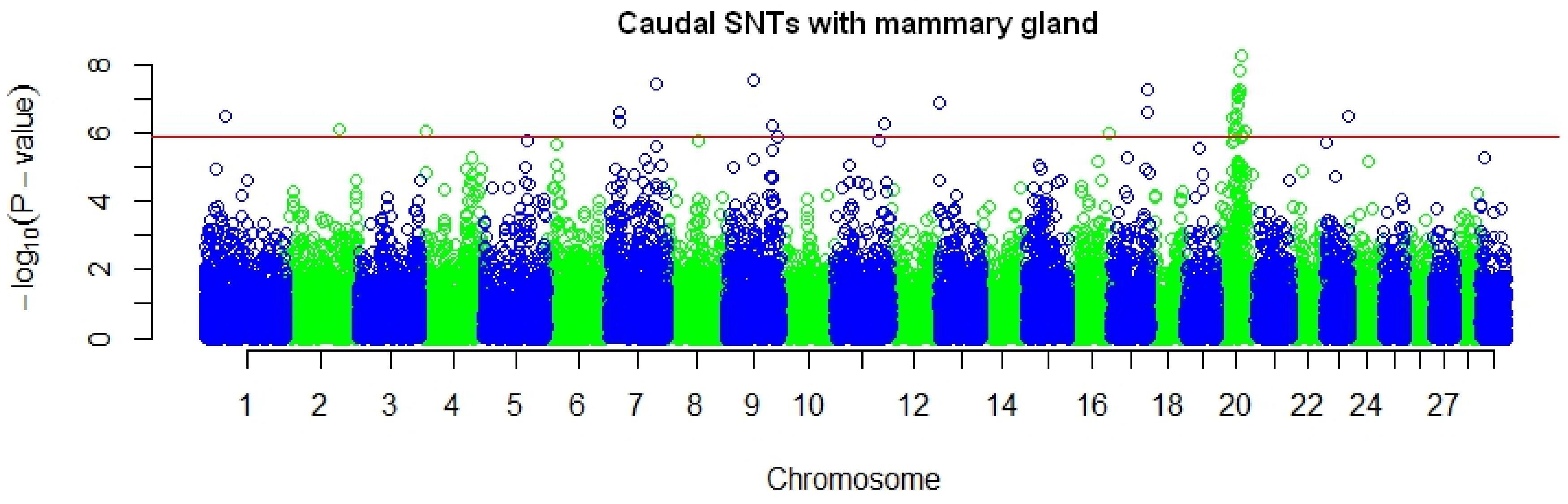
GWAS without correction



GWAS with correction



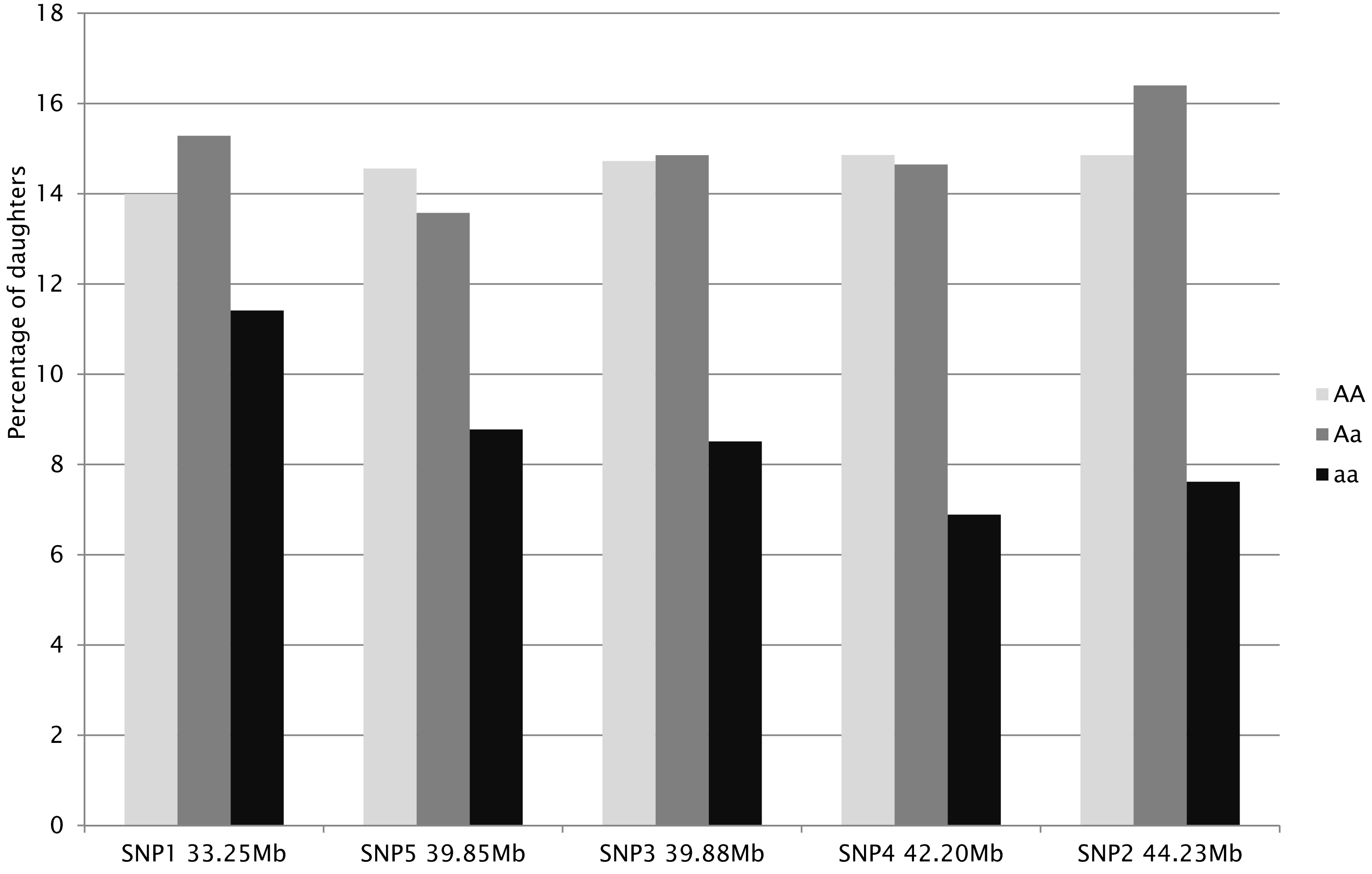
GWAS with correction



Positional candidate genes

Chr	SNP	Pos.	P-Wert	Gene
20	BTA-113191-no-rs	33MB	3.39E-12	72.5 kb D C6, 25.4 kb U PLCXD3
20	Hapmap29015	44MB	6.28E-11	105.8 kb D LOC521159
20	ARS-BFGL-35519	39MB	4.92E-10	0.4 kb U RXP3, 34.8 kb D ADAMTS12, 10.6 kb U SLC45A2
20	Hapmap42236	42MB	5.10E-10	11.8 kb U DROSHA, 75.6 kb D CDH6
20	ARS-BFGL-42798	39MB	6.04E-10	SLC45A2, 29.8 kb U AMACR
6	ARS-BFGL-114652	21MB	7.81E-10	163.4 kb D CXXC4
2	ARS-BFGL-1113	96MB	1.64E-09	PLEKHM3, 88.0 kb D CRYGA
11	Hapmap38891	26MB	3.86E-09	LOC100847553, 14.8 kb D SLC3A1
20	ARS-BFGL-114097	41MB	4.91E-09	PDZD2
27	BTB-01409826	8MB	5.56E-09	556.7 kb U AGA

Putative dominant inheritance



Conclusion

- SNP selection is necessary
- Correction of stratification is very important
- Genetic architecture of intercalary and caudal supernumerary teats was different
- Caudal supernumerary teats showed a QTL with dominant inheritance

More information

Animal Genetics 2014 in press

A genome-wide association study reveals a QTL influencing caudal supernumerary teats in Holstein cattle

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Thank you for your attention