

**Supplementary Table S2.** Genomic associations with post-cryopreservation sperm head abnormalities with regard to previously unknown candidate genes.

Disorders	SNP	BTA <sup>1</sup>	SNP position (bp)	p-value	Alleles	SNP location	Candidate genes <sup>2</sup>
Absence of acrosomes	BTA-96609-NO-RS	2	76,035,542	1.38E-05	C/T	intergenic variant	<i>ENSBTAT00000074814.1</i>
	BTB-00349550	8	57,559,835	6.08E-06	G/A	intergenic variant	<i>ENSBTAG00000006294</i> (69.6 Kb)
	ARS-BFGL-NGS-62112	9	103,671,451	2.89E-15	G/T	intergenic variant	<i>ENSBTAG00000052029</i> (87.3 Kb)
	BTB-00395187	9	59,571,491	2.89E-15	C/T	intron variant	<i>ENSBTAG00000049952</i>
	BTB-00395273	9	59,595,970	2.89E-15	G/A	intron variant	<i>ENSBTAG00000049952</i>
	ARS-BFGL-NGS-91628	12	49,371,159	5.20E-06	C/T	intergenic variant	<i>ENSBTAG00000054652</i> (15.7 Kb)
	ARS-BFGL-NGS-100023	15	1,242,901	2.89E-15	A/G	intergenic variant	<i>ENSBTAG00000055028</i> (66.8 Kb). <i>ENSBTAG00000046387</i> (60 Kb)
	BTA-21339-NO-RS	19	47,200,732	5.20E-06	C/T	intron variant	<i>ENSBTAG00000055001</i>
	BOVINEHD200019839	20	68,361,188	1.08E-05	G/T	intergenic variant	<i>ENSBTAG00000045462</i> (48.4 Kb)
	ARS-BFGL-BAC-28344	23	4,359,518	1.09E-06	A/G	intergenic variant	<i>ENSBTAG00000046193</i> (177.4 Kb)
	HAPMAP40994-BTA-46361	19	61,630,610	5.50E-06	T/C	intergenic variant	<i>ENSBTAG00000049077</i> (34.1 Kb)
Sperm head disorders	ARS-BFGL-NGS-113327	18	12,295,233	5.88E-06	C/T	intergenic variant	<i>ENSBTAG00000054270</i> (114.6 Kb)
	ARS-BFGL-NGS-57214	8	7,032,385	5.88E-06	A/G	intergenic variant	<i>ENSBTAG00000053818</i>
	BTB-01402723	10	94,482,815	5.88E-06	A/T	intron variant	<i>ENSBTAG00000050021</i>
	HAPMAP39869-BTA-78346	10	14,327,969	5.88E-06	T/C	upstream gene variant	<i>C10H15orf61</i>
	HAPMAP41900-BTA-54636	22	46,309,192	5.88E-06	C/T	intergenic variant	<i>ENSBTAG00000049764</i> (47.7 Kb)
	HAPMAP44656-BTA-67751	3	45,405,468	1.07E-05	C/T	intergenic variant	<i>bta-mir-137</i> (38.2 Kb)
Swollen acrosomes	HAPMAP23010-BTA-142347	4	76,657,995	1.76E-07	T/G	intergenic variant	<i>bta-mir-2420</i> (51.8 Kb)
Wrinkled acrosomes							

<sup>1</sup> BTA, *Bos taurus* chromosome. <sup>2</sup> Distance from a significant SNP to the respective gene is given in parentheses.