Supplementary Material: Novel InDels of *GHR*, *GHRH*, *GHRHR* and Their Association with Growth Traits in Seven Chinese Sheep Breeds

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Table S1. PCR primer sequences of InDels in sheep *GH*, *GHR*, *GHRH* and *GHRHR* gene.

Gene	Name	Primer Sequences (5′-3′)		Tm (°C)	Products(bp)
GH	*GH*-P1	F: CTTGACCTGCATACAGATTT	R: AAAAGGCAGAGGAACCAC	TD-PCR	206 + 7
	GHR-P1	F: TTAGTCCAAATGCCAAAG	R: TAAGTTGTCCTTCCACCC	TD-PCR	231 − 16
	GHR-P2	F: AAACGTGGAGAAGGGACT	R: TTAATCGGAGGATAACTGC	TD-PCR	295 − 15
	GHR-P3	F: CGACCTAACCTGCCCTGTG	R: TGACTCTGCGACCCTTTG	TD-PCR	278 − 6
	GHR-P4	F: GGGATTCCCTTCACTTCTCA	R: AGGCTCCTTGTCTTTCTCGT	TD-PCR	296 − 12
	GHR-P5	F: GGATACCTGGGTTCAATC	R: GGTAACCTCCTTTGTTTCT	TD-PCR	191 + 6
	GHR-P6	F: TTTGCTCAGGAAGGTTGG	R: TCAGCTTAAACATGGAAGAC	TD-PCR	196 − 11
	GHR-P7	F: GGGAAACCCCACATAGTA	R: TGCATATTAGAAATGTAGCC	TD-PCR	217 − 7
	GHR-P8	F: TCTTGTTTCCTACCCACCAC	R: TGCATGGGCCATCAGTTT	TD-PCR	168 + 7
	GHR-P9	F: TGGCAGGAAAGCTATGAC	R: TCAGTCCTTCCAATGAGTAT	TD-PCR	259 + 11
	GHR-P10	F: CTACCAAAGGCTGGATTC	R: TTTCAGGGGCTTTAAGTT	TD-PCR	216 − 7
	GHR-P11	F: AAGAAATAGTTTGGATACG	R: ACATTGACCAAAGCATTA	TD-PCR	180 + 6
	GHR-P12	F: TTAGTTTTGCCTCATCAT	R: GGGTAGAATCAGCATCTT	TD-PCR	297 + 19
	GHR-P13	F: TTCCAAGGAGCAAGCATC	R: GGCTGGCTTAAAACTCAA	TD-PCR	174 − 14
GHR	*GHR*-P14	F: CTAAAGCCTTTGATTGTG	R: AATAAGCAGGGTGACAAT	TD-PCR	193 − 13
	GHR-P15	F: GCAACAACACTTCCCTGAC	R: TTAGGTCATGCCTGAAAGG	TD-PCR	276 + 7
	GHR-P16	F: TCCCACAGCCGTCTACTC	R: TCTGGGGATATGTCAAGGTC	TD-PCR	257 − 10
	GHR-P17	F: TCAGGCTCTGGGAGAAAG	R: CCAAGGAAATTAGCGACAT	TD-PCR	263 + 9
	GHR-P18	F: TGGGCCTCGCTGAGTATA	R: ACCCAAAAGACAGACAAACATA	TD-PCR	168 − 6
	GHR-P19	F: ATAGATTGAAAGCCCTGGTT	R: CTGGGAGTTGGTGATGGA	TD-PCR	229 − 11
	GHR-P20	F: CAGGCTTCCTTGTCTTTCA	R: AGCTTCGATACTTTGGTCAC	TD-PCR	284 − 14
	GHR-P21	F: CGGTCCAATTCACCAGAT	R: AGAATCCCACGGACAAAG	TD-PCR	202 − 23
	GHR-P22	F: CGTGCCTTACCTGCTTCC	R: AGTCACTCTGTCCTCTGTGGG	TD-PCR	204 − 14
	GHR-P23	F: TTTTCCCTCTTCACTTCT	R: CTCTTCATTCATAACAGCA	TD-PCR	288 − 13
	GHR-P24	F: AATAAGCAAAGCTAACAATCC	R: AAACAGCACGCTGTCAAG	TD-PCR	176 − 18
	GHR-P25	F: CAGTGACCAAAACCATCC	R: TTATCTCACCTTGCTATTCC	TD-PCR	185 − 8
	GHR-P26	F: TTGGAGATACAGCAATGA	R: GCTCTTTCCTGGTAACTT	TD-PCR	162 + 19
	GHR-P27	F: GTGGACACCAGGTGAGAAA	R: GAAAGAGGAAGAAAAGGAAAC	TD-PCR	190 − 9

	GHR-P28	F: ATTCACTTCTTGGGTCATTT	R: GCACTTCACTTCCCTTCA	TD-PCR	188 + 6
	GHR-P29	F: GAGACCAAACCTGTCAATCC	R: CAACCATCCCATCCTCAG	TD-PCR	183 − 6
	GHR-P30	F: GGGATGCCAGAGTTTCAG	R: GATGCTGCTTCTGGTGAC	TD-PCR	253 + 7
	GHR-P31	F: AACATTTCTTCAGGAGGC	R: CTCATTTTCATGCATTGG	TD-PCR	199 − 7
	GHR-P32	F: TGACTGAGCGACTAAGCAC	R: AGTAAAGGAAGCCAGCAAT	TD-PCR	180 − 21
	GHR-P33	F: CTGAGGGCAGTGGTTGAA	R: CTCAGCAATGGCATCTTTA	TD-PCR	185 − 38
	GHR-P34	F: GCATCTGGTCCCATCATTTC	R: GCTTTCCTTATGGTCCAACTCT	TD-PCR	281 − 12
	GHR-P35	F: CGCCAGTCTCCTCTGTCCAT	R: ATAAGCTCGCCGACCTAACC	TD-PCR	260 + 46
	GHR-P36	F: AGGGTGAACTCAAGGAAAGC	R: ATAAGACCCAATGGCAAGAAC	TD-PCR	224 − 27
	GHR-P37	F: GGCTACAGTCCGTAGGGTCG	R: GGTGTTTGCTGGCAGGTTT	TD-PCR	291 − 7
	GHR-P38	F: AGGCTCCTTGTCTTTCTCGT	R: TGTGGGATTCCCTTCACTTC	TD-PCR	299 − 10
	GHR-P39	F: TCACAGTTCTAGCCAATGCTG	R: TCCGACTCTTTGCGACCC	TD-PCR	274 − 13
	GHR-P40	F: ACGCCACAGCCTCTTCTATC	R: CAAGCCCTATGTGCATTTACT	TD-PCR	238 − 16
	GHR-P41	F: CCCCTCTACCTTCCTTCTG	R: TTGGTCTTCCCTCATCTTTAT	TD-PCR	193 − 13
	GHR-P42	F: CCTGGAAATAAGAGTTTAGGA	R: AGGATGGGAGACAGTGATG	TD-PCR	286 − 19
	GHR-P43	F: CTGTGAAGTCTCACCAGTGC	R: GGATAGGCAGAATGCTAAAG	TD-PCR	100 − 23
	GHR-P44	F: GAAATACCCTTGTGGACAGA	R: CTGGATTTATTGTTATTGTCTATTG	TD-PCR	297 − 31
	GHR-P45	F: TCAGAGTCAAATCCTACCCTTGG	R: AGGATGCTTGGGGCTGTTG	TD-PCR	293 − 36
	GHR-P46	F: AAAGGCAGTTCAGGATGGG	R: AACCTTGATTGTGAATATCTAGGTAA	TD-PCR	207 − 8
	GHR-P47	F: GTGGGTTGCTGTTTCTTCC	R: ATCTGCTTACATGGTGGTATTT	TD-PCR	283 − 34
	GHR-P48	F: TTGCCTTGAAACAGAAAAC	R: AAAGAAAACAGGGGACACT	TD-PCR	221 − 18
	GHR-P49	F: GTCTACAAGGCTCCTCCATCTAC	R: GGCATCCCAGTGACTATTTCC	TD-PCR	217 − 7
	GHR-P50	F: CCGACCTAACCTGCCCTGTG	R: TGTCTGACTCTGCGACCCTTTG	TD-PCR	283 − 45
	GHR-P51	F: GCAGAGGGCAACCAGAGTA	R: GGAATGGCACAGGATCTCA	TD-PCR	258 − 15
	GHR-P52	F: GAACCAGCCAGGAAGGGAG	R: GAAGGCGATTCAGAAAGGAGAT	TD-PCR	239 − 13
	GHR-P53	F: GGGAAGCCACCAGGATTCTT	R: TACCTTGTCTTTGTTTGTTGTTGTTG	TD-PCR	120 − 23
	GHR-P54	F: AAGTATTTGTTGAATCACCAGT	R: GGCTCTATAGCTTCTTTACTGT	TD-PCR	263 − 47
	GHR-P55	F: TGCGTTCAACTGATTTGGT	R: GGTCCTTTGGTGGCCCTTA	TD-PCR	250 + 36
	GHR-P56	F: AGGAAATTTGCAGCAAGTGC	R: CACTGGCTGCTGCTTGGAAG	TD-PCR	190 − 18
	GHR-P57	F: GCTTGAGTTATCACTGCAAAT	R: CTGGATTTATTGTTATTGTCTATTG	TD-PCR	192 − 50
GHRH	*GHRH*-P1	F: GGCTACAGTCCATAGGGTCAC	R: CACCTGGGTTCAAGTTCTGC	TD-PCR	250 − 6
	GHRHR-P1	F: TCTGGTGGCCTGGCTTGGA	R: GGGATCGTGAGGACTGGGAG	TD-PCR	286 − 8
GHRHR	*GHRHR*-P2	F: AACCCCTGTCTCAGTTTCTCC	R: GATCTCAGTCCTCACCTCCAA	TD-PCR	150 − 21
	GHRHR-P3	F: CCTTGTCACCTGGAGACTTGGA	R: GAAACCCCTACCTTGCCCAC	TD-PCR	251 − 39

Notes: TD-PCR: Touch-down polymerase chain reaction; *GH*: Growth hormone; *GHR*: growth hormone receptor; *GHRH*: Growth hormone releasing hormone; *GHRHR*: Growth hormone releasing hormone receptor; F: Forward primer; R: Reverse primer; T_m: Melting temperature.

Table S2. Hardy Weinberg equilibrium test for gene frequency and genotype frequency of six mutant sites in seven populations.

Loci	HS	STHS	LFTS	TS	ATS	BBS	DLS
***GHR*-21**	0.000	0.116	0.309	0.002	0.288	0.052	0.415
***GHR*-43**	0.742	0.903	0.840	0.193	0.361	0.280	0.624
***GHR*-44**	0.448	0.964	0.591	0.403	0.006	0.333	0.004
***GHR*-53**	0.430	0.016	0.283	0.002	0.986	0.543	0.645
GHRH	0.113	0.000	0.008	0.002	0.672	0.784	0.557
***GHRHR*-2**	0.023	0.164	0.283	0.010	0.916	0.980	0.196

Table S3. Relationship between variations of *GHR*, *GHRH* and *GHRHR* and their growth traits ($p < 0.1$).

Loci	Breeds	Growth Traits	Observed Genotypes (LSM [a] ± SE)			
			II	*ID*	*DD*	*p* values
	HS	thurl width	17.43 [a] ± 0.09 (*n* = 161)	17.11 [a] ± 0.31 (*n* = 18)	18.40 [a] ± 0.29 (*n* = 5)	0.075
***GHR*-21**	**STHS**	hip height	63.27 [a] ± 0.33 (*n* = 144)	61.55 [a] ± 0.76 (*n* = 42)	63.50 [a] ± 2.99 (*n* = 4)	0.069
	LFHS	hip height	77.92 [a] ± 1.27 (*n* = 25)	71.50 [b] ± 2.07 (*n* = 7)	84.50 [a] ± 3.50 (*n* = 2)	0.019
	STHS	body length	58.08 [a] ± 0.62 (*n* = 90)	60.19 [a] ± 0.75(*n* = 80)	58.84 [a] ± 1.29(*n* =2 0)	0.088
	STHS	body height	62.60 [b] ± 0.45 (*n* = 90)	64.26 [a] ± 0.46 (*n* = 80)	62.37 [a,b] ± 0.85 (*n* = 20)	0.023
***GHR*-43**	**STHS**	chest depth	27.17 [b] ± 0.29 (*n* = 90)	27.89 [a,b] ± 0.27 (*n* = 80)	28.66 [a] ± 0.61 (*n* = 20)	0.036
	TS	hip width	13.88 [b] ± 0.27 (*n* = 48)	15.10 [a,b] ± 0.30 (*n* = 27)	16.50 [a] ± 0.50 (*n* = 2)	0.005
	TS	tail width	18.86 [a] ± 0.45 (*n* = 48)	19.65 [a] ± 0.63 (*n* = 27)	24.25 [a] ± 0.75 (*n* = 2)	0.053

	HS	chest circumference	77.14 [a] ± 0.37 (*n* = 142)	76.05a [a] ± 0.79 (*n* = 38)	72.50 [a] ± 2.36 (*n* = 4)	0.069
	HS	cannon girth	7.15 [a] ± 0.04 (*n* = 142)	6.97 [a] ± 0.11 (*n* = 38)	6.75 [a] ± 0.43 (*n* = 4)	0.095
***GHR*-44**	**HS**	body weight	32.73 [a] ± 0.36 (*n* = 141)	31.03 [b] ± 0.83 (*n* = 38)	27.18 [b] ± 1.94 (*n* = 4)	0.009
	STHS	body height	62.82 [b] ± 0.36 (*n* = 129)	64.00 [a,b] ± 0.62 (*n* = 54)	66.14 [a] ± 1.30 (*n* = 7)	0.044
	TS	head depth	14.53 [b] ± 1.32 (*n* = 26)	14.94 [a] ± 0.11 (*n* =4 2)	14.20 [b] ± 0.32 (*n* = 10)	0.007
	HS	cannon girth	6.96 [b] ± 0.09 (*n* = 49)	7.12 [a,b] ± 0.05 (*n* = 97)	7.25 [a] ± 0.10 (*n* = 38)	0.049
	STHS	chest depth	27.23 [a] ± 0.33 (*n* = 52)	27.41 [a] ± 0.29 (*n* = 83)	28.33 [a] ± 0.37 (*n* = 55)	0.056
***GHR*-53**	**STHS**	chest circumference	72.20 [a,b] ± 0.78 (*n* = 52)	71.00 [b] ± 0.61 (*n* = 83)	73.60 [a] ± 0.91 (*n* = 55)	0.043
	TS	forehead width	12.00 [b] ± 0.27 (*n* = 5)	12.86 [a] ± 0.11 (*n* = 47)	12.90 [a] ± 0.15 (*n* = 25)	0.049
	TS	tail length	30.50 [a] ± 1.02 (*n* = 4)	30.53 [a] ± 0.83 (*n* = 47)	33.67 [a] ± 0.90 (*n* = 26)	0.082
	STHS	cannon girth	7.02 [a] ± 0.15 (*n* = 18)	6.88 [a] ± 0.13 (*n* = 40)	7.18 [a] ± 0.06 (*n* = 132)	0.061
GHRH	**TS**	hip width	48.10 [a] ± 0.69 (*n* = 10)	49.70 [a] ± 0.47 (*n* = 23)	50.23 [a] ± 0.40 (*n* = 45)	0.054
	STHS	thurl width	62.53 [b] ± 0.41 (*n* = 120)	63.07 [a,b] ± 0.54 (*n* = 57)	65.50 [a] ± 0.54 (*n* = 13)	0.054
***GHRHR*-2**	**TS**	hip width	49.30 [a] ± 0.37 (*n* = 35)	50.36 [a] ± 0.42 (*n* = 41)	47.00 [a] ± 2.00 (*n* = 2)	0.055
	LFTS	body length	72.23 [a] ± 1.48 (*n* = 23)	76.75 [a] ± 1.87 (*n* = 8)	79.50 [a] ± 1.50 (*n* = 3)	0.089

LFHS	body weight	47.27 [b] ± 2.96 (n = 23)	58.95 [a,b] ± 4.88 (n = 8)	62.87 [a] ± 3.68 (n = 3)	0.050

a,b Values with different superscript letters in the same row differ at $p < 0.05$ for lower-case.