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Eight Y chromosome genes show copy number variations in horses

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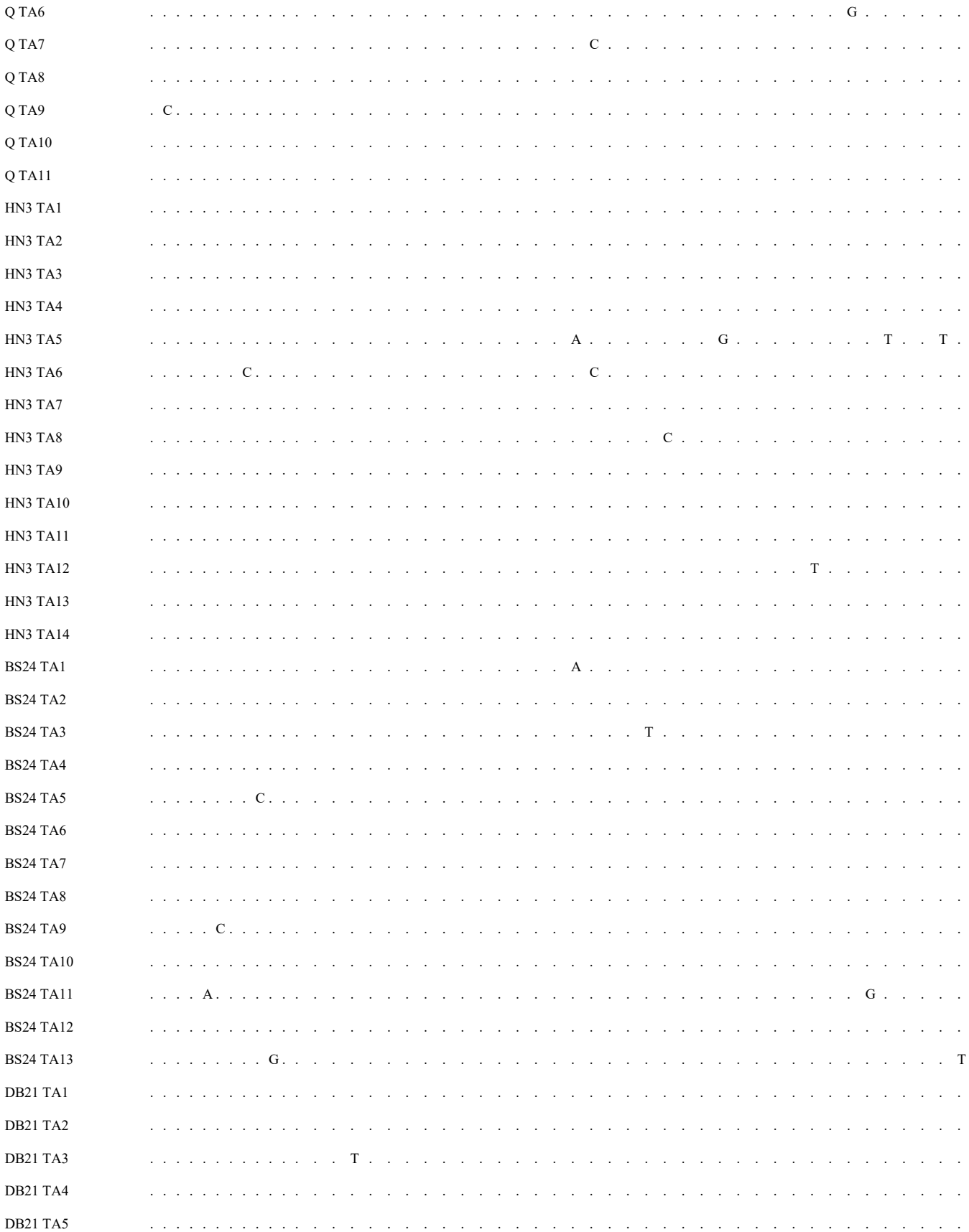
Table S1. primer information for eight horse Y chromosome genes

Gene		Primer F	Primer R	Tm (℃)	Length (bp)	Accession number
beta actin		CACGCCTTTTGCTCACTTGTC	ACGGGCTTTGTCACACGAG	63-65.6	203	NC_009156
ETSTY1	Equus Testis-specific transcript on Y 1	GACGGACGACCTTGTGTTTT	CTAGTGGCGAGTCCTTTTGG	63	234	EU687549
ETSTY4	Equus Testis-specific transcript on Y 4	GCGTCTGTGCAGATGTGTCT	GCTCATGCAGTCAAACAGGA	65	175	EU687552
ETSTY5	Equus Testis-specific transcript on Y 5	CAAAACCAAGAGGAGGACCA	CTCCAGAGGCAGGTACTTCG	65	210	EU687553
EIF1AY	Translation initiation factor 1A Y	GATCGTGGCCTTCTGACATT	TTATTTTTGGGCATGGTGGT	63	187	ET052957
SRY	Sex determining region Y	CCAACGCTTTATCTTCGCA	CCATTTCCTCTTGTTTCACTCC	63	203	NM_001081810
ETY4	Equus transcript Y4	TGGGGATATTGGCTTAGCTG	CTGGGAGCACGTCTGTATCA	65.6	180	EU687558
UBE1Y	Ubiquitin activating enzyme Y	TGGCCAACTCACGGCTGATCCAA	CTTCTCCACTCACCCTACTTGGG	65.6	210	EU687568
YIR2	Inverted repeat 2 Y	AGGGTTGGGCTAAGTCACCT	ACCTTGGATCCAGACTCACG	65.6	170	EU687570

Table S2 TA cloning results for *EIF1AY* gene

	2	3	3	5	5	6	7	7	7	8	9	10	10	11	12	12	14	17	17	17	19	20	22	23	23	24	24	25	26	26	26	27	30	30	30	32	33	35	36	36	36	39	40	42	43	43	43	44
	4	5	7	2	3	6	2	4	8	9	8	0	7	8	0	7	8	3	6	9	2	7	1	4	6	5	7	1	3	6	7	1	4	5	6	8	2	3	2	3	4	0	5	4	3	4	5	4
reference sequence	A	T	T	T	T	T	A	T	T	A	T	G	A	T	G	C	A	T	G	T	T	T	A	C	T	A	T	T	T	T	C	T	C	T	A	T	T	T	C	A	A	A	A	A	G	A	C	A
BS1 TA1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA5	.	.	.	.	.	.	.	.	.	G	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	.
BS1 TA7	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA9	.	.	.	.	.	.	T	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	T	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
BS1 TA15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Q TA1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Q TA2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Q TA3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Q TA4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Q TA5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	G	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.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Q TA8
Q TA9 C
Q TA10
Q TA11
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HN3 TA2
HN3 TA3
HN3 TA4
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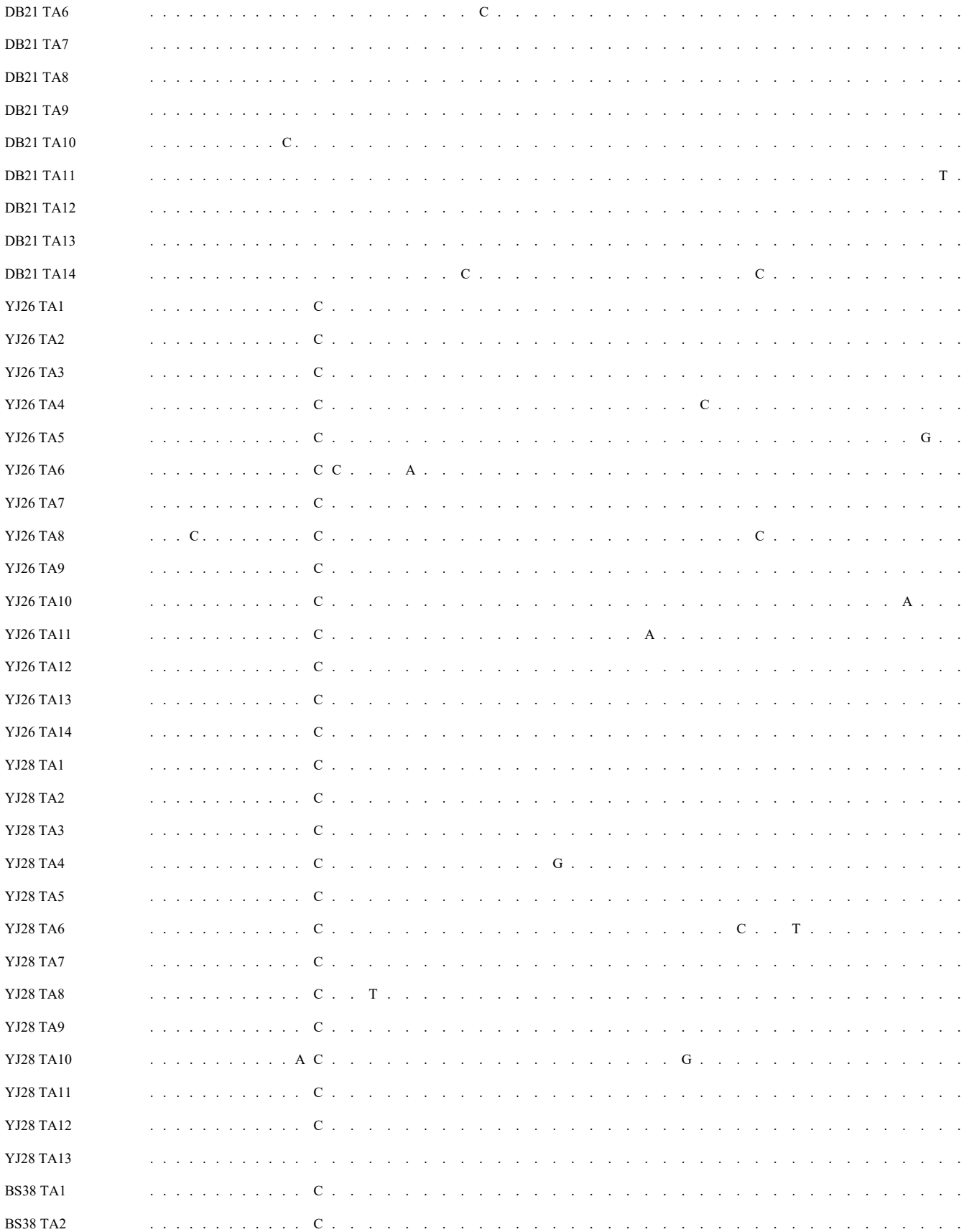
HN3 TA6 C C
HN3 TA7
HN3 TA8 C
HN3 TA9
HN3 TA10
HN3 TA11
HN3 TA12 T
HN3 TA13
HN3 TA14
BS24 TA1 A
BS24 TA2
BS24 TA3 T
BS24 TA4
BS24 TA5 C
BS24 TA6
BS24 TA7
BS24 TA8
BS24 TA9 C
BS24 TA10
BS24 TA11 A G
BS24 TA12
BS24 TA13 G T
DB21 TA1
DB21 TA2
DB21 TA3 T
DB21 TA4
DB21 TA5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DB21 TA7
DB21 TA8
DB21 TA9
DB21 TA10
DB21 TA11
DB21 TA12
DB21 TA13
DB21 TA14
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YJ26 TA2
YJ26 TA3
YJ26 TA4
YJ26 TA5
YJ26 TA6
YJ26 TA7
YJ26 TA8
YJ26 TA9
YJ26 TA10
YJ26 TA11
YJ26 TA12
YJ26 TA13
YJ26 TA14
YJ28 TA1
YJ28 TA2
YJ28 TA3
YJ28 TA4
YJ28 TA5
YJ28 TA6
YJ28 TA7
YJ28 TA8
YJ28 TA9
YJ28 TA10
YJ28 TA11
YJ28 TA12
YJ28 TA13
BS38 TA1
BS38 TA2

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BS38 TA3    . . . . . C . . . . . .
BS38 TA4    . . . . . C . . . . . . . . . . C . . . . . .
BS38 TA5    . . . . . C . . . . . .
BS38 TA6    . . . . . C . . . . . .
BS38 TA7    . . . . . C . . . . . .
BS38 TA8    G. . . . . C . . . . . .
BS38 TA9    . . . . . C . . . . . .
BS38 TA10   . . . . . C . . . . . .
BS38 TA11   . . . . . C . . . . . .
BS38 TA12   . . . . . C . . . . . . . . . . C . . . . . .
BS38 TA13   . . . . . C . . . . . .
BS38 TA14   . . . . . C . . . . . G . . . . . . . . . . T . . . . . .
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Table S3: Multiple pair-wise comparisons of median copy number (MCN) of *UBE1Y* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	*	nsd	—											
CKY	**	nsd	nsd	—										
DB	nsd	nsd	nsd	*	—									
GU	nsd	nsd	*	*	nsd	—								
GZ	nsd	***	***	***	***	nsd	—							
HN	nsd	nsd	**	nsd	nsd	nsd	***	—						
HSK	nsd	nsd	**	nsd	nsd	nsd	***	nsd	—					
NQ	*	nsd	nsd	nsd	nsd	nsd	***	nsd	nsd	—				
MY	*	nsd	nsd	nsd	nsd	nsd	***	nsd	nsd	nsd	—			
MG	***	**	*	nsd	**	*	***	***	**	nsd	nsd	—		
YJ	nsd	nsd	nsd	nsd	nsd	nsd	***	nsd	nsd	nsd	nsd	**	—	
YS	**	nsd	nsd	nsd	nsd	nsd	***	nsd	nsd	nsd	nsd	nsd	nsd	—

Note: nsd: no significant difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. The full name of each breed is listed in Table 1.

Table S4: Multiple pair-wise comparisons of median copy number (MCN) of *SRY* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	nsd	nsd	—											
CKY	nsd	nsd	nsd	—										
DB	nsd	nsd	nsd	nsd	—									
GU	nsd	nsd	nsd	nsd	nsd	—								
GZ	nsd	nsd	nsd	nsd	nsd	nsd	—							
HN	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—						
HSK	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—					
NQ	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—				
MY	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—			
MG	nsd	nsd	*	*	*	nsd	**	*	nsd	nsd	nsd	—		
YJ	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—	
YS	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	**	nsd	—

Note: nsd: no significant difference; * P < 0.05; ** P < 0.01; *** P < 0.001. The full name of each breed is listed in Table 1.

Table S5: Multiple pair-wise comparisons of median copy number (MCN) of *EIF1AY* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	***	**	—											
CKY	*	*	nsd	—										
DB	nsd	nsd	nsd	nsd	—									
GU	nsd	nsd	*	nsd	nsd	—								
GZ	nsd	nsd	***	**	nsd	nsd	—							
HN	nsd	nsd	**	*	nsd	nsd	nsd	—						
HSK	*	nsd	nsd	nsd	nsd	nsd	*	nsd	—					
NQ	*	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—				
MY	nsd	nsd	*	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—			
MG	***	***	*	**	**	**	***	***	*	*	**	—		
YJ	nsd	nsd	***	***	nsd	nsd	nsd	nsd	**	*	nsd	***	—	
YS	nsd	nsd	***	**	nsd	nsd	nsd	nsd	*	nsd	nsd	***	nsd	—

Note: nsd: no significant difference; * *P* < 0.05; ** *P* < 0.01; *** *P* < 0.001. The full name of each breed is listed in Table 1.

Table S6: Multiple pair-wise comparisons of median copy number (MCN) of *ETSTY1* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	***	**	—											
CKY	nsd	nsd	nsd	—										
DB	nsd	nsd	**	nsd	—									
GU	nsd	nsd	nsd	nsd	nsd	—								
GZ	**	*	nsd	nsd	*	nsd	—							
HN	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—						
HSK	nsd	nsd	**	*	nsd	nsd	**	nsd	—					
NQ	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—				
MY	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—			
MG	nsd	nsd	***	**	nsd	nsd	***	nsd	nsd	nsd	nsd	—		
YJ	nsd	nsd	***	**	nsd	nsd	***	nsd	nsd	nsd	nsd	nsd	—	
YS	nsd	nsd	***	**	nsd	nsd	***	*	nsd	nsd	nsd	nsd	nsd	—

Note: nsd: no significant difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. The full name of each breed is listed in Table 1.

Table S7: Multiple pair-wise comparisons of median copy number (MCN) of *ETSTY4* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	nsd	nsd	—											
CKY	**	*	*	—										
DB	*	nsd	nsd	nsd	—									
GU	nsd	nsd	nsd	nsd	nsd	—								
GZ	***	***	***	***	***	*	—							
HN	nsd	nsd	nsd	*	*	nsd	***	—						
HSK	nsd	nsd	nsd	nsd	nsd	nsd	***	nsd	—					
NQ	nsd	nsd	nsd	nsd	nsd	nsd	**	nsd	nsd	—				
MY	nsd	nsd	nsd	nsd	nsd	nsd	**	nsd	nsd	nsd	—			
MG	*	nsd	nsd	nsd	nsd	nsd	***	*	nsd	nsd	nsd	—		
YJ	nsd	nsd	nsd	nsd	nsd	nsd	***	nsd	nsd	nsd	nsd	nsd	—	
YS	nsd	nsd	nsd	nsd	nsd	nsd	***	nsd	nsd	nsd	nsd	nsd	nsd	—

Note: nsd: no significant difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. The full name of each breed is listed in Table 1.

Table S8: Multiple pair-wise comparisons of median copy number (MCN) of *ETSTY5* gene.

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	***	***	—											
CKY	**	**	***	—										
DB	**	***	***	nsd	—									
GU	nsd	nsd	nsd	nsd	nsd	—								
GZ	***	***	nsd	***	***	nsd	—							
HN	**	***	***	*	nsd	nsd	***	—						
HSK	**	***	**	*	nsd	nsd	**	nsd	—					
NQ	nsd	nsd	**	nsd	nsd	nsd	**	nsd	nsd	—				
MY	*	***	*	*	nsd	nsd	*	nsd	nsd	nsd	—			
MG	nsd	nsd	***	nsd	nsd	nsd	***	**	**	nsd	*	—		
YJ	***	***	**	***	*	nsd	***	nsd	nsd	nsd	nsd	***	—	
YS	*	*	***	nsd	nsd	nsd	***	*	*	nsd	nsd	nsd	***	—

Note: nsd: no significant difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. The full name of each breed is listed in Table 1.

Table S9: Multiple pair-wise comparisons of median copy number (MCN) of *ETY4* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	nsd	nsd	—											
CKY	*	**	***	—										
DB	nsd	nsd	nsd	nsd	—									
GU	nsd	nsd	nsd	nsd	nsd	—								
GZ	nsd	*	nsd	***	*	nsd	—							
HN	nsd	nsd	nsd	*	nsd	nsd	**	—						
HSK	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	—					
NQ	*	nsd	*	nsd	nsd	nsd	**	nsd	nsd	—				
MY	nsd	nsd	*	nsd	nsd	nsd	**	nsd	nsd	nsd	—			
MG	***	**	***	nsd	*	nsd	***	**	nsd	nsd	nsd	—		
YJ	nsd	nsd	nsd	**	nsd	nsd	nsd	nsd	nsd	*	nsd	***	—	
YS	nsd	nsd	nsd	*	nsd	nsd	**	nsd	nsd	nsd	nsd	**	nsd	—

Note: nsd: no significant difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. The full name of each breed is listed in Table 1.

Table S10: Multiple pair-wise comparisons of median copy number (MCN) of *YIR2* gene

	BLK	BS	CD	CKY	DB	GU	GZ	HN	HSK	NQ	MY	MG	YJ	YS
BLK	—													
BS	nsd	—												
CD	nsd	nsd	—											
CKY	nsd	nsd	*	—										
DB	nsd	nsd	nsd	*	—									
GU	nsd	nsd	nsd	*	*	—								
GZ	*	***	nsd	***	*	nsd	—							
HN	nsd	nsd	*	nsd	**	*	***	—						
HSK	nsd	nsd	nsd	nsd	*	*	***	nsd	—					
NQ	nsd	nsd	nsd	nsd	nsd	nsd	*	nsd	nsd	—				
MY	nsd	nsd	nsd	nsd	nsd	nsd	**	nsd	nsd	nsd	—			
MG	nsd	nsd	nsd	nsd	nsd	*	***	nsd	nsd	nsd	nsd	—		
YJ	nsd	nsd	nsd	nsd	nsd	*	**	nsd	nsd	nsd	nsd	nsd	—	
YS	nsd	**	nsd	***	nsd	nsd	*	**	**	*	**	**	nsd	—

Note: nsd: no significant difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. The full name of each breed is listed in Table 1.