

## APPENDIX II

### A) Breed-wise distribution of 62 haplotypes for D-loop hypervariable region (HVR) across Indian cattle breeds (*B. indicus*)

[Hap# Freq. Sequences]

[Hap\_1: 4 AMC10, AMC15, DAC34, MLC28]

[Hap\_2: 80 AMC11, DAC1, DAC2, DAC20, DAC3, DAC33, DAC4, DAC9, GAC25, GAC31, GAC32, GAC4, GIC10, GIC2, GIC31, GIC33, GIC5, HAC18, HAC2, HAC20, HAC22, KHC13, KHC18, KHC4, KHC50, KHC52, KYC11, KYC16, KYC42, MLC16, MLC25, MLC26, MLC27, MLC3, MLC34, MLC4, NMC1, NMC12, NMC14, NMC20, NMC24, NMC25, NMC28, NMC40, NMC41, NMC9, ONC10, ONC11, RAC42, RAC44, RAC45, RAC6, RSC13, RSC14, RSC15, RSC20, RSC21, RSC24, RSC27, RSC28, RSC31, RSC6, RSC7, RSC8, RSC9, SAC1, SAC10, SAC11, SAC17, SAC18, SAC20FII, SAC23, SAC3, SAC45, SAC6, SAC7, SAC8, SAC9, UMCB16, UMCB29]

[Hap\_3: 85 AMC14, AMC27', AMC4-II', AMC5-II', AMC52, DAC15, DAC27, DAC38, GAC10, GAC16, GAC37FII, GAC43FII, GAC47FII, GIC1, GIC19, GIC22, GIC26, GIC29, HAC14, HAC19, HAC3, HAC4, HAC5, HAC6, KHC2, KHC20, KHC28, KHC29, KHC35, KHC47, KHC7, KYC10, KYC2, KYC27FII, KYC29, KYC3, KYC30, KYC37FII, KYC38FII, KYC6, KYC9, MLC15, MLC20, MLC23, MLC30, MLC33, MLC35, MLC36, MLC40, MLC41, MLC42, MLC43, NMC10, NMC11, NMC15, NMC21, NMC27, NMC36, NMC39, NMC44, NMC6, ONC14, ONC21, ONC22, ONC33, RAC1, RAC11FII, RAC12FII, RAC19, RAC2, RAC3, RAC33, RAC37, RAC4, RAC40, RSC11, RSC2, RSC4, SAC13, SAC24, SAC26, SAC4, SAC45I, SAC5, UMCB10]

[Hap\_4: 8 AMC2, AMC31, DAC22, NMC34, ONC5, ONC7, RAC28, UMCB17]

[Hap\_5: 2 AMC43, AMC8]

[Hap\_6: 17 AMC44, AMC45, GIC32, KHC42, KYC23FII, KYC26, ONC25, ONC28, ONC29, ONC30, ONC32, ONC34, ONC35, ONC36, ONC37, ONC39, UMCB2]

[Hap\_7: 1 DAC26]

[Hap\_8: 2 DAC35, KHC10]

[Hap\_9: 3 DAC36, MLC46, RAC21]

[Hap\_10: 1 DAC37]

[Hap\_11: 1 GAC11]

[Hap\_12: 25 GAC13, GAC14FII, GAC15FII, GAC23, GAC24FII, GAC27, GAC28, GAC34FII, GIC12, HAC10, HAC11, HAC15, HAC21, HAC8, KHC30, KHC5, KHC53, KYC4, KYC44FII, KYC8, MLC10, ONC26, RAC25, RAC32, RAC5]

[Hap\_13: 1 GAC19FII]

[Hap\_14: 1 GAC40FII]

[Hap\_15: 1 GAC6FIII]

[Hap\_16: 1 GIC18]

[Hap\_17: 1 GIC3]

[Hap\_18: 1 GIC7]

[Hap\_19: 1 HAC12]

[Hap\_20: 1 HAC13]

[Hap\_21: 1 HAC17]

[Hap\_22: 2 HAC7 RSC3]

[Hap\_23: 1 HAC9]

[Hap\_24: 4 KHC19 KHC22 ONC23 ONC24]

[Hap\_25: 1 KHC38]

[Hap\_26: 1 KHC43]

[Hap\_27: 1 KHC49]

[Hap\_28: 1 KHC55]



Hap\_16 ...T.....T.....T.....C....  
Hap\_17 .....C.....A.....  
Hap\_18 ...A.....CT...T.....  
Hap\_19 .....TC.....T.....C....  
Hap\_20 .....T.....T.....A.C....  
Hap\_21 .....T.....C..T.....C....  
Hap\_22 .....T.....T...C.....C....  
Hap\_23 .....T.....T.....G.....C....  
Hap\_24 .....T.....T.....C....  
Hap\_25 ..C.TGC.TGCT..GT..TGTGT..TTTTAT...G...A.C.CC.  
Hap\_26 .....T.C.....  
Hap\_27 ...T...T..T.....T.....CC...  
Hap\_28 ..C..GC.TGCT..GT..TTGTGT..TTTTGT...G...A.C..C.  
Hap\_29 ..C..GC.TGCT..GT...G.GT...TTGT...G.....C....  
Hap\_30 .....T.....G...T.....C....  
Hap\_31 .....T.....T..G.....C....  
Hap\_32 .....T..T.....T.....C..C  
Hap\_33 .....C.....T.....C....  
Hap\_34 ..C..GC.TGCT..GT..TTGTGT..TTTTAT...G...A.C..CC  
Hap\_35 .....T.....T.....C..C  
Hap\_36 ...A.....C.....T.....  
Hap\_37 .....T.....T.....A...C....  
Hap\_38 .....T..T.....G.....T.....C....  
Hap\_39 .....T.....T.....C.C..  
Hap\_40 .....C.....T.....  
Hap\_41 .....T.....T.....C.C....  
Hap\_42 .....T..T...T.....T.....C....  
Hap\_43 .....T...T...T...T.....C....  
Hap\_44 .....A.....T.....C....  
Hap\_45 .....T..T..G.....T.....C....  
Hap\_46 .....G.....  
Hap\_47 .....T.C.....T.....C....  
Hap\_48 ...T...T..T.....T.....A.C....  
Hap\_49 .....T...C.....T.....C....  
Hap\_50 ...T...T..T...T.....T.....C....  
Hap\_51 .....C..G.....  
Hap\_52 .....C.....T.....  
Hap\_53 ..C.....T.....T.....C....  
Hap\_54 .....T.....T...C.....C....  
Hap\_55 .....T...T.....T...C.....C....  
Hap\_56 .....T.C.....C....  
Hap\_57 .....T.....T.....  
Hap\_58 ...T...C.....T.....G.....  
Hap\_59 .....GT..T.....T.....C....  
Hap\_60 .....C.....C  
Hap\_61 .A.....C.....  
Hap\_62 .....T..T...T.....T.....C....

## B) Genetic indices for complete mtDNA D-loop region

Table I: Number of haplotype (H), haplotype diversity (HD), nucleotide diversity (Pi) and average number of nucleotide differences (K) in 14 Indian cattle breeds.

Breeds	Sample Size	S	H	HD	Pi	K
AMC	14	52	13	0.989	0.018	16.726
DAC	16	19	14	0.975	0.005	4.892
GAC	21	18	12	0.919	0.005	4.352
GIC	15	50	14	<b>0.990</b>	0.012	11.076
HAC	20	19	15	0.942	0.004	3.489
KHC	24	54	18	0.967	0.016	14.206
KYC	27	57	22	0.974	0.018	16.119
MLC	31	37	<b>25</b>	0.981	0.006	5.948
NMC	25	20	18	0.943	0.005	4.813
ONC	25	54	14	0.910	<b>0.025</b>	<b>22.867</b>
RAC	27	23	23	0.986	0.005	4.667
RSC	27	18	17	0.960	0.006	5.059
SAC	20	8	7	0.837	0.003	2.889
UMC	11	48	10	0.982	0.013	12.036
Overall	303	95	165	0.974	0.011	10.227

AMC: Amritmahal, DAC: Dangi, GAC: Gaolao, GIC: Gir, HAC: Haryana, KHC: Khillar, KYC: Kangyam, MLC: Malvi, NMC: Nimari, ONC: Ongole, RAC: Rathi, RSC: Red Sindhi, SAC, Sahiwal, UMC: Umblecherry.

## C) Breed-wise distribution of 165 haplotypes for complete D-loop region among Indian cattle breeds (*B. indicus*)

[Hap# Freq. Sequences]

[Hap\_1: 1 AMC10]

[Hap\_2: 12 AMC11, DAC9, GAC25, GAC31, GAC4, GIC2, KHC18, KHC4, KYC16, MLC3, NMC14, SAC6]

[Hap\_3: 39 AMC14, AMC4, DAC15, DAC27, DAC38, GAC16, GAC43, GIC1, GIC29, HAC14, HAC19, HAC3, HAC4, HAC5, KHC2, KHC29, KHC35, KHC7, KYC10, KYC37, KYC38, MLC33, MLC36, MLC40, MLC41, NMC11, NMC27, NMC36, NMC39, NMC44, NMC6, ONC33, RAC12, RAC3, RAC4, RSC4, SAC13, SAC4, SAC5]

[Hap\_4: 1 AMC15]

[Hap\_5: 1 AMC2]

[Hap\_6: 1 AMC27]

[Hap\_7: 2 AMC31, NMC34]

[Hap\_8: 1 AMC43]

[Hap\_9: 1 AMC44]

[Hap\_10: 5 AMC45, KHC42, ONC25, ONC30, ONC39]

[Hap\_11: 1 AMC5]  
 [Hap\_12: 2 AMC52, RAC11]  
 [Hap\_13: 1 AMC8]  
 [Hap\_14: 1 DAC1]  
 [Hap\_15: 2 DAC2, RSC27]  
 [Hap\_16: 3 DAC20, HAC22, UMB29]  
 [Hap\_17: 1 DAC22]  
 [Hap\_18: 1 DAC26]  
 [Hap\_19: 1 DAC3]  
 [Hap\_20: 1 DAC33]  
 [Hap\_21: 1 DAC34]  
 [Hap\_22: 1 DAC35]  
 [Hap\_23: 2 DAC36, MLC46]  
 [Hap\_24: 1 DAC37]  
 [Hap\_25: 13 DAC4, KYC42, MLC16, MLC27, NMC1, NMC25, RAC6, RSC15, SAC1, SAC11, SAC17, SAC18, SAC45]  
 [Hap\_26: 1 GAC10]  
 [Hap\_27: 1 GAC11]  
 [Hap\_28: 12 GAC13, GAC14, GAC15, GAC28, GAC34, GIC12, HAC11, HAC8, KHC30, KHC5, MLC10, RAC5]  
 [Hap\_29: 1 GAC19]  
 [Hap\_30: 5 GAC23, GAC24, GAC27, HAC21, KYC8]  
 [Hap\_31: 16 GAC32, GIC10, MLC25, MLC4, NMC20, NMC9, RSC13, RSC6, RSC7, RSC9, SAC10, SAC20, SAC23, SAC7, SAC8, SAC9]  
 [Hap\_32: 2 GAC37, GIC22]  
 [Hap\_33: 1 GAC40]  
 [Hap\_34: 1 GAC47]  
 [Hap\_35: 1 GAC6]  
 [Hap\_36: 1 GIC18]  
 [Hap\_37: 1 GIC19]  
 [Hap\_38: 1 GIC26]  
 [Hap\_39: 1 GIC3]  
 [Hap\_40: 1 GIC31]  
 [Hap\_41: 1 GIC32]  
 [Hap\_42: 1 GIC33]  
 [Hap\_43: 1 GIC5]  
 [Hap\_44: 1 GIC7]  
 [Hap\_45: 1 HAC10]  
 [Hap\_46: 1 HAC12]  
 [Hap\_47: 1 HAC13]  
 [Hap\_48: 1 HAC15]  
 [Hap\_49: 1 HAC17]  
 [Hap\_50: 1 HAC18]  
 [Hap\_51: 1 HAC2]  
 [Hap\_52: 1 HAC20]  
 [Hap\_53: 1 HAC6]  
 [Hap\_54: 1 HAC7]  
 [Hap\_55: 1 HAC9]  
 [Hap\_56: 1 KHC10]  
 [Hap\_57: 1 KHC13]  
 [Hap\_58: 3 KHC19, ONC23, ONC24]  
 [Hap\_59: 6 KHC20, KHC28, ONC14, SAC24, SAC26, SAC45]  
 [Hap\_60: 1 KHC22]  
 [Hap\_61: 1 KHC38]

[Hap\_62: 1 KHC43]  
[Hap\_63: 1 KHC47]  
[Hap\_64: 1 KHC49]  
[Hap\_65: 1 KHC50]  
[Hap\_66: 1 KHC52]  
[Hap\_67: 1 KHC53]  
[Hap\_68: 1 KHC55]  
[Hap\_69: 1 KHC56]  
[Hap\_70: 1 KYC1]  
[Hap\_71: 1 KYC11]  
[Hap\_72: 1 KYC12]  
[Hap\_73: 1 KYC14]  
[Hap\_74: 1 KYC19]  
[Hap\_75: 5 KYC2, KYC29, KYC3, KYC9, RAC19]  
[Hap\_76: 1 KYC21]  
[Hap\_77: 1 KYC23]  
[Hap\_78: 1 KYC25]  
[Hap\_79: 1 KYC26]  
[Hap\_80: 1 KYC27]  
[Hap\_81: 1 KYC30]  
[Hap\_82: 1 KYC31]  
[Hap\_83: 1 KYC35]  
[Hap\_84: 1 KYC4]  
[Hap\_85: 1 KYC44]  
[Hap\_86: 1 KYC6]  
[Hap\_87: 1 KYC7]  
[Hap\_88: 1 MLC1]  
[Hap\_89: 1 MLC14]  
[Hap\_90: 2 MLC15, MLC35]  
[Hap\_91: 1 MLC19]  
[Hap\_92: 1 MLC20]  
[Hap\_93: 1 MLC23]  
[Hap\_94: 1 MLC26]  
[Hap\_95: 1 MLC28]  
[Hap\_96: 1 MLC29]  
[Hap\_97: 1 MLC30]  
[Hap\_98: 1 MLC34]  
[Hap\_99: 1 MLC37]  
[Hap\_100: 1 MLC38]  
[Hap\_101: 1 MLC39]  
[Hap\_102: 3 MLC42, ONC21, ONC22]  
[Hap\_103: 1 MLC43]  
[Hap\_104: 1 MLC44]  
[Hap\_105: 1 MLC45]  
[Hap\_106: 1 MLC9]  
[Hap\_107: 1 NMC10]  
[Hap\_108: 1 NMC12]  
[Hap\_109: 1 NMC15]  
[Hap\_110: 1 NMC19]  
[Hap\_111: 1 NMC2]  
[Hap\_112: 1 NMC21]  
[Hap\_113: 2 NMC22, ONC6]  
[Hap\_114: 1 NMC24]  
[Hap\_115: 1 NMC28]

[Hap\_116: 2 NMC40, RAC44]  
[Hap\_117: 1 NMC41]  
[Hap\_118: 1 NMC5]  
[Hap\_119: 1 NMC8]  
[Hap\_120: 1 ONC10]  
[Hap\_121: 1 ONC11]  
[Hap\_122: 1 ONC19]  
[Hap\_123: 1 ONC26]  
[Hap\_124: 7 ONC28, ONC29, ONC32, ONC34, ONC35, ONC36, ONC37]  
[Hap\_125: 1 ONC38]  
[Hap\_126: 2 ONC5, ONC7]  
[Hap\_127: 1 ONC8]  
[Hap\_128: 2 RAC1, RAC2]  
[Hap\_129: 1 RAC10]  
[Hap\_130: 3 RAC20, RSC17, RSC22]  
[Hap\_131: 1 RAC21]  
[Hap\_132: 1 RAC25]  
[Hap\_133: 1 RAC26]  
[Hap\_134: 1 RAC28]  
[Hap\_135: 1 RAC31]  
[Hap\_136: 1 RAC32]  
[Hap\_137: 2 RAC33, RAC40]  
[Hap\_138: 1 RAC37]  
[Hap\_139: 2 RAC42, RSC28]  
[Hap\_140: 1 RAC43]  
[Hap\_141: 1 RAC45]  
[Hap\_142: 1 RAC46]  
[Hap\_143: 1 RAC7]  
[Hap\_144: 1 RAC8]  
[Hap\_145: 3 RSC1, RSC26, UMB12]  
[Hap\_146: 1 RSC10]  
[Hap\_147: 2 RSC11, RSC2]  
[Hap\_148: 1 RSC12]  
[Hap\_149: 2 RSC14, RSC8]  
[Hap\_150: 3 RSC16, RSC19, RSC29]  
[Hap\_151: 2 RSC20, RSC21]  
[Hap\_152: 1 RSC24]  
[Hap\_153: 1 RSC3]  
[Hap\_154: 1 RSC30]  
[Hap\_155: 1 RSC31]  
[Hap\_156: 1 SAC19]  
[Hap\_157: 1 SAC3]  
[Hap\_158: 1 UMB10]  
[Hap\_159: 2 UMB13, UMB20]  
[Hap\_160: 1 UMB16]  
[Hap\_161: 1 UMB17]  
[Hap\_162: 1 UMB2]  
[Hap\_163: 1 UMB24]  
[Hap\_164: 1 UMB4]  
[Hap\_165: 1 UMB8]











