

Additional file 4 Candidate genes identified at least than 3 animals among breeds. Genes, Chromosomes (Chr), Start and End position, Status of CNVR (Type), Quantitative Trait Loci (QTL), and breed in which animal exhibited the CNVR, are reported.

Gene	Chr	CNVRs	Start	End	Type	QTL*	Breed
CACNA2D1	1	16	9772408	11026535	Loss	- Egg weight (9370) Breast color (6832) Body weight gain (55933) Body weight (55913) Femur bone mineral density (9369) Body weight (1797) Age at first egg (14443) Tibia bone mineral density (24366) Body weight (24861) Tibia weight (121735) Carcass weight (12457) Heart weight (12459) Drumstick and thigh muscle weight (13400)	ANC, BPT, BSA, COR, PML, PPP, VLD
CECR2	1	68	61785019	61820587	Loss	Body slope length (16724) Carcass fat content (17118) Body weight (1799) Gizzard weight (1800) Spleen weight (1801) Humerus length (1802) Abdominal fat weight (3326) Drumstick bone weight (6681) Femur bone mineral density (6759) Shank length (9293) Body depth (9298) Chest width (9302) Tibia plateau angle (9346) Body weight gain (9742)	ANC, BPT, COR, MOD
CHRNA10	1	207	194812575	194870319	Loss	-	ANC, COR, PLN
CNTN5	1	197	183440788	183641648	Loss	-	BSA, MUG, PPP
DACH1	1	172	156700043	158194510	Mixed	- Body weight (55919) Chest width (16706) Body weight (12464) Wing percentage (15558) Head percentage (15568) Dressing percentage (15576) Breast percentage (15579) Feed intake (1822) Bone index (6790) Breast muscle weight (9410) Carcass fat content (17119) Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792) Shank weight percentage (15591) Carcass fat content, dry matter basis (17120) Carcass fat content (17129) Carcass protein content, dry matter basis (17131) Carcass ash content, dry matter basis (17132)	BPT, BSA, COR, MER, MUG, PER, PPP, PRL, ROM, VLD
DMD	1	117	114603278	115343382	Loss	Breast muscle weight (9410) Carcass fat content (17119) Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792)	ANC, BSA, MER, MUG, PML, PPP, VLD
FARP1	1	143	144856678	144936679	Loss	Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792)	MUG, PML
GRIA4	1	192	181261557	181321252	Loss	Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792)	PML
IMMP2L	1	33	27301554	28066858	Loss	Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792)	ANC, BSA, MER, MUG, PPP, VLD
KCND2	1	27	23576515	24151934	Loss	Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792)	BPT, BSA, MUG, PPP, PRL, VLD
KITLG	1	52	42972115	43026595	Loss	Body weight (14355) Humerus breaking strength (6789) Eggshell strength (1827) Eggshell thickness (1828) Shank weight (14341) Femur weight (14342) Drip loss (6833) Breast muscle weight (13385) Liver weight (1834) Body weight (9745) Body weight gain (9748) Yolk color (36795) Carcass protein content (17128) Eggshell stiffness (14364) Wing weight (1864) Femur length (14339) Shank length (14340) Abdominal fat percentage (6805) Egg weight (1776) Body weight (1778) Body weight gain (6574) Drumstick muscle weight (1779) Thigh weight (1786) Tibia marrow diameter (9339) Visceral fat weight (17319) Total white fat weight (17332) Subcutaneous neck fat weight (17325) Carcass weight (17110) Shank length (92850) Chest width (16704) Head width (16717) Wing weight (12448) Lung weight (12449) Body slope length (16722) Body weight (1788) Egg number (1792)	ANC, VLD
MIR7445-1	1	176	159119365	161967295	Mixed	Shank weight percentage (15591) Carcass fat content, dry matter basis (17120) Carcass fat content (17129) Carcass protein content, dry matter basis (17131) Carcass ash content, dry matter basis (17132) Intestine length (3327) Body weight (7005) Carcass weight (7009) Body weight (7007) Drip loss (6834) Albumen height (36754) Breast muscle pH (6836) Feed efficiency (1821) Albumen height (1823) Haugh units (1829) Abdominal fat weight (12468) Body weight (24840) Body weight (14357) Albumen height (36759) Body weight (17076) Residual feed intake (6674) Feed conversion ratio (6675) Age at sexual maturity (16807) Spleen weight (1851) Age at first egg (17058) Drumstick and thigh weight (17098) Shank length (9294) Femur bending strength (6758) Chest width (14338) Body weight (9406) Shank length (9409) Body weight gain (6755) Pectoralis major weight (1769)	BPT, BSA, COR, MER, MUG, PER, PLB, PML, PPB, PPC, PRM, ROM, VLD, VLP
NBEA	1	188	173214811	173461935	Loss	Body weight (7007) Drip loss (6834) Albumen height (36754) Breast muscle pH (6836) Feed efficiency (1821) Albumen height (1823) Haugh units (1829) Abdominal fat weight (12468) Body weight (24840) Body weight (14357) Albumen height (36759) Body weight (17076) Residual feed intake (6674) Feed conversion ratio (6675) Age at sexual maturity (16807) Spleen weight (1851) Age at first egg (17058) Drumstick and thigh weight (17098) Shank length (9294) Femur bending strength (6758) Chest width (14338) Body weight (9406) Shank length (9409) Body weight gain (6755) Pectoralis major weight (1769)	BPT, BSA, PML, PPP
NLGN4Y	1	129	126701018	127878818	Mixed	Body weight (7007) Drip loss (6834) Albumen height (36754) Breast muscle pH (6836) Feed efficiency (1821) Albumen height (1823) Haugh units (1829) Abdominal fat weight (12468) Body weight (24840) Body weight (14357) Albumen height (36759) Body weight (17076) Residual feed intake (6674) Feed conversion ratio (6675) Age at sexual maturity (16807) Spleen weight (1851) Age at first egg (17058) Drumstick and thigh weight (17098) Shank length (9294) Femur bending strength (6758) Chest width (14338) Body weight (9406) Shank length (9409) Body weight gain (6755) Pectoralis major weight (1769)	ANC, BPT, BSA, COR, MER, MUG, PML, PPP, VLD
NTS	1	49	40960483	42750311	Mixed	Body weight (7007) Drip loss (6834) Albumen height (36754) Breast muscle pH (6836) Feed efficiency (1821) Albumen height (1823) Haugh units (1829) Abdominal fat weight (12468) Body weight (24840) Body weight (14357) Albumen height (36759) Body weight (17076) Residual feed intake (6674) Feed conversion ratio (6675) Age at sexual maturity (16807) Spleen weight (1851) Age at first egg (17058) Drumstick and thigh weight (17098) Shank length (9294) Femur bending strength (6758) Chest width (14338) Body weight (9406) Shank length (9409) Body weight gain (6755) Pectoralis major weight (1769)	BPT, BSA, MER, MOD, PLN, PML, PPD, PPP, PRM, ROM, VLD
SEMA3A	1	12	8489418	9019810	Loss	Body weight (7007) Drip loss (6834) Albumen height (36754) Breast muscle pH (6836) Feed efficiency (1821) Albumen height (1823) Haugh units (1829) Abdominal fat weight (12468) Body weight (24840) Body weight (14357) Albumen height (36759) Body weight (17076) Residual feed intake (6674) Feed conversion ratio (6675) Age at sexual maturity (16807) Spleen weight (1851) Age at first egg (17058) Drumstick and thigh weight (17098) Shank length (9294) Femur bending strength (6758) Chest width (14338) Body weight (9406) Shank length (9409) Body weight gain (6755) Pectoralis major weight (1769)	BSA, PPP, VLD
SEMA3E	1	15	9382243	9727928	Loss	Body weight (7007) Drip loss (6834) Albumen height (36754) Breast muscle pH (6836) Feed efficiency (1821) Albumen height (1823) Haugh units (1829) Abdominal fat weight (12468) Body weight (24840) Body weight (14357) Albumen height (36759) Body weight (17076) Residual feed intake (6674) Feed conversion ratio (6675) Age at sexual maturity (16807) Spleen weight (1851) Age at first egg (17058) Drumstick and thigh weight (17098) Shank length (9294) Femur bending strength (6758) Chest width (14338) Body weight (9406) Shank length (9409) Body weight gain (6755) Pectoralis major weight (1769)	ANC, BSA, PPP, VLD
TBC1D22A	1	20	16306401	16316656	Loss	Abdominal fat weight (1768) Abdominal fat percentage (1816) Tibia width (9332) Cingular fat width (14360) Subcutaneous fat thickness (14359) Body weight (6752)	ANC, MOD

						Visceral fat weight (17320)	
						Body weight (220018)	
						Body weight gain (55928)	
						Carcass weight (17085)	
						Body weight (55903)	
						Breast muscle weight (17091)	
						Abdominal fat weight (11815)	
CDH10	2	274	71297366	73022774	Mixed	Tibia weight (121740)	BSA, COR, MER, PML, VLD
						Dressing percentage (15577)	
						Body weight (7170)	
						Breast muscle weight (13386)	
						Skin fat weight (1902)	
						Body weight (9752)	
						Body weight gain (9753)	
						Breast muscle weight (1904)	
CDH19	2	299	94701759	96327782	Loss	Liver weight (9390)	ANC, BPT, BSA, COR, MER, PML, PPP, VLD
						-	
						Body weight gain (220024)	
						Body weight (1928)	
CRISPLD1	2	326	118710155	119855380	Mixed	Fat distribution (12642)	BSA, COR, MER, MUG, PML, PPP, VLD
						Average daily gain (24913)	
						Body weight (220020)	
FZD6	2	333	129923471	130000481	Gain	Tibia bone mineral density (1929)	BPT, BSA, PML, PPA, PPB, PPD, ROM, VLD, VLP
						-	
						Drumstick and thigh muscle weight (13402)	
						Body weight (1873)	
MALRD1	2	225	18803152	19340567	Loss	Carcass weight (9949)	ANC, BSA, MUG, PPP, VLD
						Feet weight (9953)	
MIR10585	2	209	145205	729303	Loss	Body weight (9955)	ANC, COR, PLN, PPC, ROM, SIC
						-	
						Shank diameter (9414)	
						Shank length (9412)	
						Shank growth (11804)	
						Body weight (9415)	
						Albumen height (36760)	
MIR1681	2	298	94065271	94492342	Mixed	Eggshell strength (14365)	ANC, BSA, COR, MER, PPP, ROM, VLD
						Eggshell stiffness (14366)	
						Breast percentage (15551)	
						Body weight (14688)	
						Average daily gain (24895)	
						Tibia width (9333)	
						Feet weight (9954)	
MMP16	2	330	123843671	124547924	Loss	Meat color (1925)	BPT, BSA, PPP, VLD
						-	
						Body weight (6848)	
						Haugh units (1884)	
PHF14	2	232	26127926	26845805	Loss	Subcutaneous neck fat weight (17326)	BSA, PML, VLD
						Total white fat weight (17333)	
PHF20L1	2	347	141715539	141838625	Loss	Body weight gain (55934)	PML, PRL
						-	
						Body weight (1979)	
						Body weight (7180)	
						Body weight gain (55929)	
						Body weight (55904)	
						Body weight (1961)	
						Body weight (9420)	
ERICH1	3	449	91861636	91884809	Gain	Tibia bone mineral density (24362)	PPC, PPD, PPN
						Body weight (24882)	
						Tibia plateau angle (9348)	
						Tibia area (1985)	
						Tibia length (1986)	
						Thigh muscle weight (6856)	
						Body weight gain (9115)	
						Chest width (16707)	
						Carcass weight (6853)	
						Average daily gain (6851)	
MBOAT2	3	454	96347037	96375534	Loss	Thigh muscle weight (6682)	MER, MUG, PPD
						Average daily gain (24910)	
						Carcass weight (17385)	
CCNB3	4	472	1744762	1891212	Loss	Egg weight (95742)	ANC, PLB, PLN, SIC
CPZ	4	583	81782442	81843671	Loss	Body weight gain (95342)	BSA, MUG, ROM, VLD
CTNNA2	4	587	87151908	88348272	Loss	-	ANC, BSA, COR, MER, PML, PPP, VLD
						-	
						Visceral fat weight (17321)	
						Egg weight (17065)	
						Egg at first egg (14452)	
						Body weight (14457)	
						Average daily gain (24899)	
						Drumstick and thigh muscle weight (13404)	
GPM6A	4	535	44492121	44666971	Loss	Egg number (17062)	BSA, VLD, VLP
						Tibia width (2035)	
						Yolk height (36773)	
						Body weight (55905)	
						Body weight gain (55930)	
						Thigh meat-to-bone ratio (6695)	
						Egg weight (17067)	
						Intestine length (7165)	
						Abdominal fat weight (12439)	
						Skin fat weight (12636)	
						Drumstick and thigh muscle weight (13395)	
						Body weight (2008)	
						Carcass weight (2012)	
						Liver weight (2017)	
						Drumstick muscle weight (2057)	
						Drumstick weight (2059)	
						Wing weight (2060)	
						Body weight gain (9761)	
						Average daily gain (12500)	
						Total white fat weight (17334)	
						Albumen weight (36751)	
						Abdominal fat percentage (9421)	
KCNIP4	4	570	75180019	75188504	Loss	Yolk color (36793)	BSA
						Breast muscle pH (6839)	
						Tibia width (121733)	
						Tibia weight (121737)	
						Drumstick and thigh percentage (15557)	
						Shank length (11776)	
						Shank diameter (17178)	
						Shank length percentage (11781)	
						Tibia length (9329)	
						Tibia marrow diameter (9341)	
						Abdominal fat weight (9427)	
						Subcutaneous neck fat weight (17328)	
						Humerus area (2040)	
						Humerus length (2043)	
MIR218-1	4	571	75433061	76227387	Mixed	-	BSA, COR, MER, MUG, PPP, VLD
CSH15orf41	5	624	31446239	32004750	Loss	Heart weight (9957)	BPT, BSA, PML, PPP, ROM, VLD
						Abdominal fat weight (3321)	
METTL15P1	5	593	3867987	3995567	Loss	Body weight (17301)	PPD, PRM, VLD
						Carcass weight (17302)	
						Head width (16719)	
						Albumen weight (36755)	
NOVA1	5	627	32279535	33527206	Mixed	-	ANC, BSA, COR, PER, PPP, ROM, VLD
PRKD1	5	628	33596843	34006574	Loss	Head width (16721)	ANC, BSA, MER, MUG, PPP, ROM, VLD

						Shank diameter (9429) Shank length (9428) Egg number (17070) Carcass weight (17112) Body weight gain (55939) Breast muscle weight (9430) Egg weight (17071)	
RYR3	5	621	30185504	30565244	Mixed	Body weight (9383) Abdominal fat weight (9432) Abdominal fat percentage (9433) Egg weight (17072) Body weight (17079) Abdominal fat weight (16829) Body depth (16715) Gizzard weight (2091) Wing weight (2094) Breast muscle weight (6707)	ANC, BSA, MOD, MUG, PPA, PPD, PPP, ROM, SIC, VLD
ADK CRTAC1	6 6	680 692	15105838 22295436	15324560 22345059	Loss Loss	- -	BSA, PML ANC, COR, PLN, PPA, ROM
						Body weight (55916) Eggshell lightness (2104) Eggshell redness (2105) Eggshell yellowness (2106) Visceral fat weight (17322) Shank diameter (9438) Subcutaneous neck fat weight (17329) Total white fat weight (17335) Breast muscle weight (13388) Drumstick and thigh muscle weight (13396) Drumstick muscle weight (2122) Body weight (2126) Average daily gain (24900) Femur weight (9323) Tibia marrow diameter (9342) Humerus length (2114) Body weight (2125)	
CTNNA3	6	668	6778757	6837926	Loss	Breast muscle percentage (9440) Abdominal fat percentage (9439) Breast muscle pH (6665) Abdominal fat percentage (2161) Body weight (17304) Carcass weight (17316) Haugh units (24811) Long length of egg (2166) Eggshell strength (2168) Head percentage (15573) Drumstick bone weight (6713) Residual feed intake (6714) Thigh bone weight (6715) Tibia bone mineral content (2165) Abdominal fat weight (2167) Body weight (2146) Intestine length (7166) Breast muscle weight (17093) Drumstick and thigh weight (17101) Wing weight (17107) Egg number (17073)	PPP, VLD
KCNMA1	6	676	13338838	13800887	Loss	Humerus length (2114) Body weight (2125) Breast muscle percentage (9440) Abdominal fat percentage (9439) Breast muscle pH (6665) Abdominal fat percentage (2161) Body weight (17304) Carcass weight (17316) Haugh units (24811) Long length of egg (2166) Eggshell strength (2168) Head percentage (15573) Drumstick bone weight (6713) Residual feed intake (6714) Thigh bone weight (6715) Tibia bone mineral content (2165) Abdominal fat weight (2167) Body weight (2146) Intestine length (7166) Breast muscle weight (17093) Drumstick and thigh weight (17101) Wing weight (17107) Egg number (17073)	ANC, BSA, PPP, ROM, VLD
DNPEP	7	725	22156095	22438763	Mixed	Long length of egg (2166) Eggshell strength (2168) Head percentage (15573) Drumstick bone weight (6713) Residual feed intake (6714) Thigh bone weight (6715) Tibia bone mineral content (2165) Abdominal fat weight (2167) Body weight (2146) Intestine length (7166) Breast muscle weight (17093) Drumstick and thigh weight (17101) Wing weight (17107) Egg number (17073)	ANC, PER, PLB, PLN, PPA, ROM, SIC
OLA1	7	715	17070906	17119074	Loss	Intestine length (7166) Breast muscle weight (17093) Drumstick and thigh weight (17101) Wing weight (17107) Egg number (17073)	BPT, MUG, PPB, PPD
AP2M1	9	800	15839760	16080784	Loss	-	ANC, COR, PLB, PLN
						Egg weight (17075) Body weight (2217) Body weight (9442) Shank diameter (9443) Albumen height (36761) Body weight (6634) Body weight gain (6635) Abdominal fat weight (2220) Average daily gain (24906) Wing weight (9402) Yolk color (36792) Body weight (6846)	ANC, COR, PLB, PLN, PPA, ROM
AP3S2 FURIN	10 10	838 839	19871135 20111115	20072538 20151158	Loss Loss	- Carcass weight (17114) Spleen weight (2287) Breast color (6842) Thigh meat-to-bone ratio (6736) Body weight (6737)	ANC, PLB, PLN, ROM, SIC PLN, ROM
FANCA	11	866	18875867	19187550	Loss	Carcass weight (17114) Spleen weight (2287) Breast color (6842) Thigh meat-to-bone ratio (6736) Body weight (6737)	ANC, COR, PLB, PPA
GLTB01 GNAJ2	12 12	868 874	776479 3083810	801671 3254044	Loss Loss	- Body weight gain (95348) Total white fat weight (17336)	ANC, COR, PPD, PRL ANC, COR, ROM
LAMB2	12	887	11566718	11620544	Loss	Humerus area (2292) Body weight (2300)	ANC, PLN
NPRL2 RFT1	12 12	871 869	1445724 1153259	1599237 1261670	Mixed Gain	Subcutaneous neck fat weight (17330) - -	ANC, COR, PLB, PLN, PPA, SIC BPT, BSA, MUG, PPD
						Age at first egg (14446) Body weight (14472) Average daily gain (24902) Drumstick and thigh weight (17103) Breast muscle weight (17094) Body weight (6645) Body weight gain (6646) Femur bending strength (6774) Carcass weight (17115) Abdominal fat weight (12630) Skin fat weight (12640) Breast muscle weight (13390) Drumstick muscle weight (13393) Drumstick and thigh muscle weight (13398)	ANC, PPA, SIC
MIR7460	13	902	10310955	10403209	Loss	Heart weight (2316) Thigh weight (2318) Drumstick weight (2319) Body weight gain (9772) Tibia length (2309) Body weight (9444) Shank length (9445) Breast muscle percentage (9447) Shank diameter (9448) Carcass weight (17089)	ANC, PPA, SIC

RASGEF1C	13	906	14004880	14063370	Gain	Body weight (17081) Tibia width (2307) Humerus width (2308) Thigh meat-to-bone ratio (6742) Drumstick muscle weight (6743) Chest width (16712) Body weight (17082) Breast muscle weight (17095) Body weight gain (55943) Intramascular fat percentage (17339) Drumstick and thigh weight (17104) Eggshell stiffness (14379)	PPA, PPB, PPC, PPD
CORO7	14	930	12713624	12825221	Loss	Body weight (17082) Breast muscle weight (17095) Body weight gain (55943) Intramascular fat percentage (17339) Drumstick and thigh weight (17104) Eggshell stiffness (14379)	ANC, COR, PPA, ROM, SIC
MIR1588	14	939	13969298	14223919	Loss	-	ANC, COR, PLB, PLN, PPA, PPC, ROM, SIC
CRYBA4	15	949	7168696	7314774	Loss	Abdominal fat weight (12631) Fat distribution (12645) Age at first egg (14447) Liver weight (2348) Body weight (24887) Abdominal fat percentage (9450) Humerus bone mineral content (2344) Tibia bone mineral density (2345) Tibia breaking strength (2346) Body weight (6648) Body weight gain (6649) Carcass fat content, dry matter basis (17121) Carcass fat content (17122) Carcass protein content, dry matter basis (17123) Yolk height (36776)	ANC, PPA, PPC
DGCR6	15	955	10115804	10170236	Loss	Body weight (6579) Body weight gain (6585) Body depth (16714) Head width (16718) Intestine length (9385) Shank circumference (9386) Gizzard weight (9387) Drumstick and thigh muscle weight (13401) Skin fat weight (1856) Average daily gain (24903) Abdominal fat weight (7010) Abdominal fat percentage (6820) Abdominal fat weight (6822) Body weight (7000) Body weight gain (9120) Bursa of Fabricius weight (2356) Body weight (2355)	ANC, COR, PLN
CDK9	17	974	5408555	5475999	Loss	-	ANC, PPA
EGR17	17	983	8203965	8320514	Loss	-	ANC, PLB, PLN, PPA, SIC
KCNT1	17	985	8704436	8733835	Loss	-	PLB, PLN, PPA
MIR7442	17	972	2892618	2974989	Loss	-	ANC, PLB, PLN
PTGD5	17	966	870839	1210930	Loss	-	ANC, COR, PLB, PLN, PPA, ROM, SIC
AANAT	18	996	4321720	4419005	Loss	Abdominal fat percentage (12447) Body weight (6650) Humerus width (2365) Breast muscle weight (2367) Chest width (9307) Body weight (9773) Body weight gain (9774)	ANC, COR, PLN
MIR338	18	1002	8933984	9447920	Loss	-	ANC, PLB, PLN, PPA, SIC
MIR7443	18	1003	9785675	9910846	Loss	-	ANC, PLN, PPA, ROM, SIC
ALDH3A2	19	1027	6809522	6870051	Gain	-	ANC, PRM, VLD
CRYBA1	19	1025	5794463	5965233	Loss	-	ANC, PLN
DPH1	19	1023	5476874	5585580	Loss	-	ANC, PLN, PPA
KCTD7	19	1020	5010127	5024470	Gain	Chest width (16713) Body weight (2371) Femur torsional strength (6776) Breast muscle pH (6666)	PML, PPB, PPD, VLP
MIR12245	20	1045	10713196	10807052	Loss	-	PLB, PLN, ROM, SIC
ICMT	21	1052	568122	633056	Loss	-	ANC, PLB, PLN, ROM, SIC, VLP
LOC419429	21	1055	2670037	2695525	Loss	-	PLN, ROM, SIC, VLP
SSU72	21	1053	2099153	2126081	Gain	-	ANC, MOD, MUG, PLB, ROM, VLD
MIR12247-1	22	1074	4599266	4679301	Loss	-	PLB, PLN, ROM
GJA4	23	1086	4422620	4476944	Loss	Body weight gain (9124)	PLN
SLCSA1	23	1079	1811514	1908956	Loss	-	ANC, COR, SIC
RHBG	25	1106	1298608	1402529	Loss	-	ANC, COR, PLB, PLN, ROM
ARL8A	26	1114	207240	518493	Loss	-	ANC, COR, PLN, ROM, SIC
MIR6618	26	1121	1658239	1798597	Loss	-	ANC, COR, PLB, PLN
TFEB	26	1135	4770230	4980158	Loss	Body weight (9453) Tibia bone mineral density (2381) Tibia breaking strength (2382) Haugh units (24812) Shank weight (2383)	ANC, PLN, PPA, ROM
DHX58	27	1153	5184779	5321286	Loss	Breast muscle weight (17096) Body weight (55926) Body weight gain (55936) Shank length (30885) Body weight (55918) Shank diameter (30884) Shank weight (2413) Femur bone mineral density (6780)	ANC, COR, PLB, PPA, PPC, ROM, SIC
DLX3	27	1143	3064218	3229777	Loss	Abdominal fat weight (30887) Abdominal fat percentage (30888)	ANC, COR, PLB, PLN, PPA, ROM
JUP	27	1152	5046312	5110454	Loss	-	ANC, PLB, PLN, PPA, SIC
KIF18B	27	1138	1467365	1554992	Loss	Wing weight (17109) Femur length (6778) Femur bending strength (6779) Abdominal fat weight (11809) Abdominal fat percentage (11820) Shank weight percentage (15567) Head percentage (15599) Carcass protein content, dry matter basis (17124) Carcass fat content, dry matter basis (17125) Carcass fat content (17126) Carcass water content (17136) Body weight (2406) Body weight gain (6654) Abdominal fat percentage (3354) Carcass weight (17090) Humerus area (2396) Humerus length (2397) Yolk color (36790)	ANC, COR, PPA
LASP1	27	1148	4463118	4485720	Loss	Thigh percentage (30886)	ANC, PLB, SIC
MED24	27	1150	4585223	4888312	Mixed	-	ANC, PLB, PLN, PPC, ROM, SIC
PSMCS	27	1140	1830818	1894748	Mixed	-	ANC, COR, PLN, PPD
APC2	28	1170	3220564	3526294	Loss	Abdominal fat weight (12632) Skin fat weight (12641) Carcass weight (2420) Tibia cortex width (9338) Body weight (24893) Average daily gain (24912) Body weight gain (55941) Breast muscle weight (17097)	ANC, COR, PLB, PLN, ROM, SIC
BORCS8	28	1171	3547490	3621012	Loss	-	ANC, COR, PLB, PPA

*QTL associated with productive traits