

Detection of loci exhibiting pleiotropic effects on body weight and egg number in female broilers

Eirini Tarsani^{1*}, Andreas Kranis^{2,3}, Gerasimos Maniatis², Ariadne L. Hager-Theodorides¹, Antonios Kominakis¹

¹Department of Animal Science and Aquaculture, Agricultural University of Athens, Iera Odos 75, 11855, Athens, Greece

²Aviagen, Newbridge, Midlothian EH28 8SZ, UK

³ The Roslin Institute, University of Edinburgh, EH25 9RG, Midlothian, United Kingdom

*corresponding author: etarsani@aua.gr

Table S2: Positional candidate genes and reported QTLs for the independent cross phenotype significant SNPs.

SNP	GGA	Position (bp) ¹	Consequence (variant)	Positional candidate gene (gene ID) ²	Gene description (biotype)	Start position - end position of gene (bp)	QTL(s)
rs315275636	1	6,206,137	intron variant	CELF2 (ENSGALG00000034590)	CUGBP Elav-like family member 2 (protein coding)	6,143,111-6,513,417	none
rs317275973	1	23,082,139	intron variant	PTPRZ1 (ENSGALG00000040114)	protein tyrosine phosphatase, receptor type Z1 (protein coding)	23,044,093-23,176,470	Feather colour extended black (ID:157158)
rs312392044	1	35,990,963	intron variant	PTPRB (ENSGALG00000010049)	protein tyrosine phosphatase,	35,964,985-36,023,189	none

					<i>receptor type B (protein coding)</i>		
<i>rs316780156</i>	1	87,938,572	intron variant, non coding transcript variant	<i>LOC112530378 (112530378)</i>	<i>uncharacterized LOC112530378 (lncRNA)</i>	87,894,824-88,208,405	none
<i>rs315007062</i>	1	100,596,308	intergenic variant				none
<i>rs315995534</i>	1	110,869,322	non coding transcript exon variant	<i>LOC112530939 (112530939)</i>	<i>uncharacterized LOC112530939 (lncRNA)</i>	110,866,971-110,879,038	none
<i>rs317073055</i>	1	121,235,094	intron variant	<i>EIF1AX (ENSGALG00000016410)</i>	<i>eukaryotic translation initiation factor 1A, X-linked (protein coding)</i>	121,229,301-121,238,473	none
<i>rs317590244</i>	1	136,269,771	5 prime UTR variant	<i>LOC112531515 (112531515)</i>	<i>uncharacterized LOC112531515 (protein coding)</i>	136,266,311-136,274,265	none
<i>rs316472061</i>	1	185,926,511	intron variant,non coding transcript variant intron variant,non coding transcript variant intron variant,non coding transcript variant	<i>(ENSGALG00000047983)</i> <i>(ENSGALG00000054022)</i> <i>LOC107052371 (107052371)</i>	<i>novel gene (lncRNA)</i> <i>novel gene (lncRNA)</i> <i>uncharacterized LOC107052371 (lncRNA)</i>	185,849,508-185,992,637 185,912,084-185,975,486 185,906,858-185,939,575	Tibia length (ID: 135878), Feed intake (IDs: 64551, 64552,64553,64555),Dry matter intake (ID: 64554)
<i>rs14135719</i>	2	8,489,508	intron variant,non coding transcript variant	<i>LOC112531942 (112531942)</i>	<i>uncharacterized LOC112531942 (lncRNA)</i>	8,477,606-8,512,826	Feather crested head (ID: 127112), Feather colour extended

							black (ID: 157162)
<i>rs13543487</i>	2	27,103,453	intergenic variant				Feather crested head (ID: 127112),pH of digestive tract contents (ID: 96617),Feather colour extended black (ID: 157164)
<i>rs317979230</i>	2	59,469,333	intergenic variant				Feather crested head (ID: 127112),Wattles weight (ID: 127117)
<i>rs315191969</i>	2	75,552,665	intron variant	<i>LOC101749223 (101749223)</i>	<i>unconventional myosin-X-like (protein coding)</i>	75,494,741-75,646,604	Feather crested head (ID: 127112),Wattles weight (ID: 127117)
<i>rs15140482</i>	2	107,231,066	intron variant	<i>NOL4 (ENSGALG00000015198)</i>	<i>nucleolar protein 4 like (protein coding)</i>	107,062,555-107,248,585	Feather crested head (ID: 127112),Wattles weight (ID: 127117)
<i>rs15156742</i>	2	133,305,723	intergenic variant				Wattles weight (ID: 127117)
<i>rs313125064</i>	3	21,986,853	intron variant	<i>TMEM206 (421371)</i>	<i>transmembrane protein 206 (protein coding)</i>	21,967,280-22,050,297	Comb weight (ID: 127114)

<i>rs317668107</i>	3	33,354,124	intergenic variant				Comb weight (ID: 127114), Jejunum length (ID: 96631)
<i>rs314958778</i>	3	52,121,842	intergenic variant				Comb weight (ID: 127114), Residual feed intake (ID: 64556)
<i>rs313973628</i>	4	8,970,286	intergenic variant				none
<i>rs313178030</i>	4	26,530,662	intergenic variant				none
<i>rs317953448</i>	4	43,384,266	intergenic variant				Ileum weight (ID: 96634)
<i>rs15608447</i>	4	66,459,916	intron variant intron variant, non coding transcript variant	<i>SLAIN2</i> (<i>ENSGALG00000014115</i>) <i>LOC107053243 (107053243)</i>	<i>SLAIN motif family member 2 (protein coding)</i> <i>uncharacterized LOC107053243 (lncRNA)</i>	66,459,339-66,485,331 66,450,553-66,472,818	none
<i>rs313208295</i>	4	80,292,623	intron variant	<i>SORCS2</i> (<i>ENSGALG00000015554</i>)	<i>sortilin related VPS10 domain containing receptor 2 (protein coding)</i>	79,986,601-80,511,445	none
<i>rs312798022</i>	5	8,828,819	intron variant, non coding transcript variant intron variant, non coding transcript variant	(<i>ENSGALG00000051198</i>) <i>LOC107053374 (107053374)</i>	<i>novel gene (lncRNA)</i> <i>uncharacterized LOC107053374 (lncRNA)</i>	8,788,839-8,838,256 8,748,372-8,865,519	none
<i>rs313257959</i>	5	30,658,287	intron variant	<i>FMN1</i> (<i>ENSGALG00000009723</i>)	<i>formin 1 (protein coding)</i>	30,598,320-30,751,690	none
<i>rs314038572</i>	5	50,471,323	intron variant	<i>MARK3</i> (<i>ENSGALG00000011505</i>)	<i>microtubule affinity regulating kinase 3 (protein coding)</i>	50,439,883-50,500,972	none

<i>rs314529054</i>	6	21,832,302	intron variant	<i>CPEB3</i> (<i>ENSGALG00000006912</i>)	<i>cytoplasmic polyadenylation element binding protein 3 (protein coding)</i>	21,812,767-21,889,131	Ovary weight (ID: 147744), Body weight 21 days (ID: 95406)
<i>rs314712068</i>	6	35,135,780	intron variant non coding transcript exon variant	<i>EBF3</i> (<i>ENSGALG00000010461</i>) <i>LOC107053752 (107053752)</i>	<i>early B cell factor 3 (protein coding)</i> <i>uncharacterized LOC107053752 (lncRNA)</i>	35,112,704-35,230,061 35,127,705-35,152,732	none
<i>rs313879964</i>	7	36,286,374	intron variant	<i>ACVR1</i> (<i>ENSGALG000000037301</i>)	<i>activin A receptor type 1 (protein coding)</i>	36,257,915-36,304,135	none
<i>rs314425715</i>	8	770,143	intron variant, non coding transcript variant intron variant	(<i>ENSGALG000000048836</i>) <i>AMY2A (414140)</i>	<i>novel gene (lncRNA)</i> <i>amylase, alpha 2A (pancreatic) (protein coding)</i>	715,737-835,787 440,098-801,038	Ileum weight (ID: 96639)
<i>rs317902708</i>	8	21,684,030	intron variant	<i>MAST2 (424606)</i>	<i>microtubule associated serine/threonine kinase 2 (protein coding)</i>	21,613,724-21,776,006	Feathered feet (ID: 127123), Body weight 21 days (ID: 95408)
<i>rs317315660</i>	9	17,942,760	intron variant, non coding transcript variant intron variant	(<i>ENSGALG000000050743</i>) <i>TBL1XR1 (426284)</i>	<i>novel gene (lncRNA)</i> <i>transducin beta like 1 X-linked receptor 1 (protein coding)</i>	17,900,261-17,996,324 17,895,996-18,186,649	Wattles weight (ID: 127118)
<i>rs14952656</i>	10	17,996,013	intron variant	<i>CHSY1</i> (<i>ENSGALG000000026468</i>)	<i>chondroitin sulfate synthase 1 (protein coding)</i>	17,984,884-18,044,858	none

<i>rs316546378</i>	11	5,124,955	intron variant,non coding transcript variant	(<i>ENSGALG00000053968</i>)	<i>novel gene (lncRNA)</i>	5,102,154-5,159,147	Feed intake (ID: 64559)
<i>rs318098582</i>	11	18,407,493	missense variant	<i>ZC3H18</i> (<i>ENSGALG00000006118</i>)	<i>zinc finger CCCH-type containing 18 (protein coding)</i>	18,379,252-18,412,636	none
<i>rs318048363</i>	12	6,154,483	intron variant,non coding transcript variant	<i>LOC107054451 (107054451)</i>	<i>uncharacterized LOC107054451 (lncRNA)</i>	6,145,475-6,164,001	none
<i>rs318032338</i>	13	16,259,361	intergenic variant				Feathered feet (ID: 127125),Breast muscle weight (ID: 96643),Feed conversion ratio (ID: 64562),Feather colour extended black (ID: 157195)
<i>rs317631529</i>	14	5,738,298	intron variant	<i>CACNA1H</i> (<i>ENSGALG00000005215</i>)	<i>calcium voltage-gated channel subunit alpha1 H (protein coding)</i>	5,667,870-5,837,019	Wattles length (ID: 127121),Body weight 36 days (ID: 64519)
<i>rs314778226</i>	15	4,845,973	intergenic variant				none
<i>rs317370260</i>	17	1,629,390	intergenic variant				Egg production rate (ID: 24945)
<i>rs313997974</i>	18	6,177,837	intergenic variant				Breast muscle weight (ID: 96653)

<i>rs313536194</i>	19	9,937,564	intergenic variant				Abdominal fat percentage (ID: 71126),Dry matter digestibility (ID: 95424)
<i>rs317414603</i>	20	6,729,013	intergenic variant				none
<i>rs314420361</i>	21	698,421	intron variant	<i>NPHP4</i> (<i>ENSGALG00000000966</i>)	<i>nephrocystin 4</i> (protein coding)	693,159-714,164	Body weight (ID: 95430),Egg shell color (ID: 24964)
<i>rs317101069</i>	23	3,379,059	synonymous variant	<i>EXTL1</i> (100859367)	<i>exostosin like glycosyltransferase 1</i> (protein coding)	3,374,545-3,380,690	none
<i>rs14291881</i>	24	150,829	intron variant	<i>VPS11</i> (<i>ENSGALG00000029536</i>)	<i>VPS11, CORVET/HOPS core subunit</i> (protein coding)	77,314-151,086	none
<i>rs316343530</i>	26	2,854,350	intron variant	<i>PLXNA2</i> (419857)	<i>plexin A2</i> (protein coding)	2,754,008-3,101,360	Excreta weight (ID: 96622),Tibia length (ID: 135881)
<i>rs315329074</i>	27	6,920,352	intron variant	<i>CACNB1</i> (777366)	<i>calcium voltage-gated channel auxiliary subunit beta 1</i> (protein coding)	6,913,935-6,926,259	Wattles weight (ID: 127120),Comb weight (ID: 127127),Femur bone mineral content (ID: 130479),Femur weight (ID: 130480),Proventriculus weight (ID: 96672),Body

							weight hatch (ID: 135726)
<i>rs314496246</i>	28	3,661,043	intergenic variant				Feather crested head (ID: 127113)

¹Positions are based on GRCg6a assembly.

²Note that Ensembl and RefSeq transcript databases were used in VEP tool to identify genes. Gene IDs refer to Ensembl gene IDs ('ENSGAL_') or NCBI gene IDs (numerical).