

The genetic basis of a domestication trait in the chicken mapping quantitative trait loci for plumage colour



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Background

During the domestication of the chicken, selection for numerous different colour phenotypes has occurred, giving rise to a wealth of different coloured domestic breeds. Several genes have been identified that affect plumage colour in chickens, however many more remain to be identified.

Objective

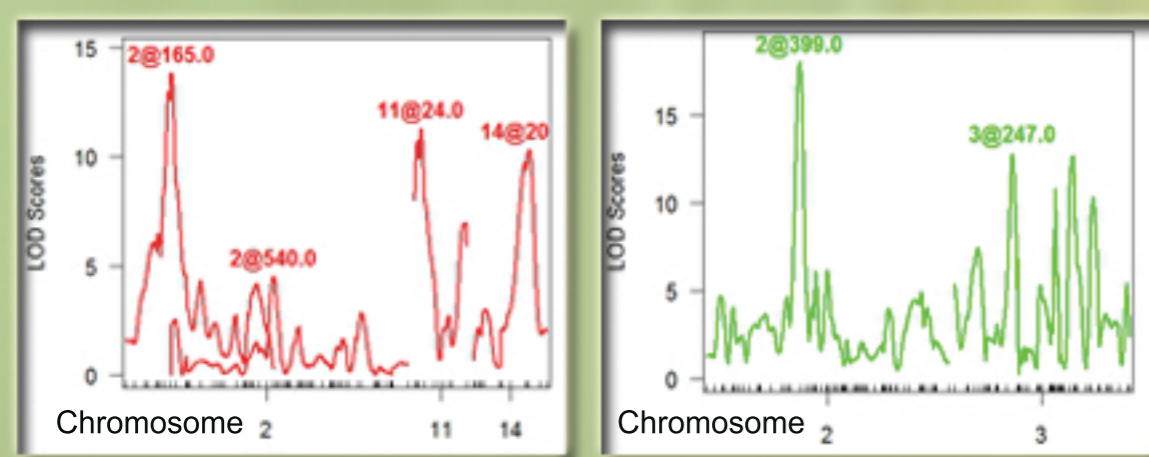
The objective of this study was to identify additional quantitative trait loci (QTLs) and candidate genes responsible for plumage colour variation in chicken.

Methods

- * 572 F₈ advanced intercross chickens have been produced
- * Genotyped with 657 molecular markers
- * Phenotyped using a digital photography and Adobe Photoshop
- * QTL analyses were done using R/qtl

Results

- * 6 QTLs; 4 for red colour and 2 for metallic green colour
- * 4 pairs of epistatic QTLs
- * Significant sex interaction



Trait (Colour)	Chr.	Locus (cM)	LOD	% var	Estimated Effect ± SE		Confidence Interval (cM)	P-value
					Additive	Dominance		
Red	2	165	13.84	12.72	10.44±11.49	3.6±12.19	25	3.50e-09***
Red	2	540	4.5	3.89	-8.48±2.5	9.43±3.64	342	6.40e-05***
Red	11	24	11.27	10.19	12.64±7.66	-45.31±12.07	30	7.01e-08***
Red	14	203	10.31	9.26	-26.28±14.21	-13.59±18.21	43	5.86e-08***
Metallic Green	2	399	18.03	14.23	0.2±0.03	-0.1±0.05	21	4.14e-14***
Metallic Green	3	247	12.85	9.9	0.01±0.04	-0.39±0.08	272	1.57e-09***

Conclusion

The results of this study suggest that appearance of pigmentation in chicken plumage is due to the combined effect of many loci and highly influenced by sex.

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