Polymorphisms associated with egg number at 300 days of age in chickens

H.P. Xu*, H. Zeng*, D.X. Zhang1, X.L. Jia1, C.L. Luo2, M.X. Fang3, Q.H. Nie1 and X.Q. Zhang1

1Department of Animal Genetics, Breeding and Reproduction, College of Animal Science, South China Agricultural University, Guangzhou, Guangdong, China
2Institute of Animal Science, Guangdong Academy of Agricultural Sciences, Guangzhou, Guangdong, China
3Department of Laboratory Animal Science, Medical College of Jinan University, Guangzhou, Guangdong, China

*These authors contributed equally to this study.
Corresponding author: X.Q. Zhang
E-mail: xqzhang@scau.edu.cn

Received November 19, 2010
Accepted February 2, 2011
Published October 3, 2011
DOI http://dx.doi.org/10.4238/2011.October.3.5

ABSTRACT. We looked for variations that could be associated with chicken egg number at 300 days of age (EN300) in seven genes of the hypothalamic-pituitary-gonadal axis, including gonadotrophin-releasing hormone-I (GnRH-I), GnRH receptor (GnRHR), neuropeptide Y (NPY), dopamine D2 receptor (DRD2), vasoactive intestinal polypeptide (VIP), VIP receptor-1 (VIPR-1), prolactin (PRL), and the QTL region between 87 and 105 cM of the Z chromosome. Ten mutations in the seven genes were chosen to do marker-trait association analyses in a population comprising 1310 chickens, which were obtained from a company located in Guangdong Province of China. The C1704887T of VIPR-1 was found to have a highly significant association with EN300. The T5841629C of DRD2 and the C1715301T of VIPR-1 were significantly associated with EN300. A highly significant association was also
found between the C1704887T-C1715301T haplotypes of VIPR-1 and EN300. H1H3 had the highest EN300. Four PCR-RFLP variations in the candidate QTL region were selected to investigate their genetic effects on EN300. The haplotypes of T32742468C-G32742603A in this region showed a highly significant association with EN300. Bioinformatics analyses showed that both T32742468C and G32742603A were located in intron 1 of the SH3-domain GRB2-like 2 (SH3GL2) gene. We conclude that five SNPs, including C1704887T and C1715301T of VIPR-1, T5841629C of DRD2, and T32742468C and G32742603A of SH3GL2, would be useful as markers for breeding to increase chicken EN300.

**Key words:** Association analysis; Chicken; Polymorphism; QTL; Candidate gene; Egg number at 300 days of age