

## Scientists identify mutation that causes muffs and beards to grow on chickens

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Chicken with the Muffs and beard characteristic. Credit: Ying Guo

The growth of long facial feathers, creating the appearance of muffs and beards on chickens, is caused by a chromosomal rearrangement affecting



a gene involved in feather development, report Xiaoxiang Hu of the China Agricultural University in Beijing and colleagues, in a new study published on June 2 in *PLOS Genetics*.

Unusual plumage and fancy combs aren't just interesting traits appreciated by poultry fanciers, but opportunities to explore the genetics underlying these striking variations. Scientists investigated the mutation that causes the Muffs and beard characteristic in certain chicken varieties by mapping the trait to the correct location on the chromosome and sequencing that region from <u>chickens</u> with and without Muffs and beard. They found that chickens with the Muffs and beard trait had three duplicated regions of chromosome 27, inserted next to one of the original gene regions. By examining changes in gene expression, they showed that one of the duplicated genes, HOXB8, which is known to function in feather development, was present at high levels in the <u>facial</u> skin of chickens with Muffs and beard, but not in regular chickens.

The scientists suspect that HOXB8 expression may extend the growth phase of the facial feathers, creating the characteristic bearded appearance. Other HOX gene members are linked to feather development, such as HOXC8, which is associated with a crest of feathers on top of the head. The findings present an excellent model for exploring the regulation of HOX genes in different parts of the body during development.

Dr. Guo says: "Muffs and beard in chicken is caused by a structural variation that consists of three duplicated regions on GGA27 and results in the ectopic expression of HOXB8 in facial skin. Our findings show the significance for structural variations on phenotypic diversity and a novel role for HOXB8 in feather formation. In future study, we'll focus on the regulation of HOX genes in feather cycles."

More information: Guo Y, Gu X, Sheng Z, Wang Y, Luo C, Liu R, et



al. (2016) A Complex Structural Variation on Chromosome 27 Leads to the Ectopic Expression of HOXB8 and the Muffs and Beard Phenotype in Chickens. *PLoS Genet* 12(6): e1006071. DOI: 10.1371/journal.pgen.1006071

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