

**From Genebank into Breeding Line –
An animal model for introgression of blue egg shell color into a White
Leghorn line**

Dierks Claudia, Ha Ngoc-Thuy, Simianer Henner, Preisinger Rudolf, Weigend Steffen
Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Institute of Farm
Animal Genetics, 31535, Neustadt claudia.dierks@fli.de, Germany
University of Goettingen, Department of Animal Sciences, 37075, Goettingen nha@gwdg.de,
Germany

University of Goettingen, Department of Animal Sciences, 37075, Goettingen
hsimian@gwdg.de, Germany

LOHMANN TIERZUCHT GmbH, 27472, Cuxhaven preisinger@ltz.de, Germany
Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Institute of Farm
Animal Genetics, 31535, Neustadt Steffen.Weigend@fli.de, Germany

Corresponding author : claudia.dierks@fli.de

Under the umbrella of Horizon 2020 and as part of the EU project IMAGE (Innovative Management of Genetic Resources), the objective of this study is to demonstrate the efficient transfer of a specific trait maintained in gene bank, here blue egg shell color, into a contemporary high performing white egg layer chicken line by means of marker-assisted introgression.

Blue egg shell color is inherited as a dominant trait (Wang et al. 2013, Wragg et al., 2013). The causal mutation is a 4,2 kb retroviral insertion on chromosome 1 upstream of *SLCO1B3* at 65,22 Mb (Wang et al. 2013, Wragg et al., 2013). The insertion induces overexpression of *SLCO1B3* in the oviduct which results in increased biliverdin concentrations (Wang et al. 2013, Wragg et al., 2013). The insertion is present in the breeds Araucana, Donxiang and Lushi, while the insertion sites are different (Wang et al. 2013, Wragg et al., 2013).

In 2016, six Araucana cocks were mated with twelve White Leghorn hens. For the Araucana cocks whole genome sequencing was performed on the Illumina HiSeq2500 (Illumina, San Diego, CA) in paired-end mode with a mean coverage of 30x. The White Leghorn hens were genotyped using the 600K Axiom® Genome-Wide Chicken Genotyping Array (Affymetrix, Santa Clara, CA). All F1 cocks were genotyped on a 60K SNP Chip (Affymetrix). Based on genotype data of the Araucana and White Leghorn, we identified 24 informative SNPs on chromosome 1 surrounding the insertion site. By combining them with 12 SNPs from the 60K SNP chip we constructed Araucana and White Leghorn specific haplotypes from 60 to 71 Mb on chromosome 1. Haplotype information in combination with 60K SNP genotypes will be used to select animals with a recombination site closest to the insertion, highest proportion of recipient genome and highest degree of diversity for breeding. Based on this, two marker-assisted backcross generations followed by an intercross-generation will be generated, aiming at a high performing White Leghorn-like line which is homozygous for blue egg shell color.

Keywords : "chicken"; "blue egg shell"; "marker-assisted introgression"