

Introgression of Blue Eggshell Color from a Gene Bank Collection into a White Leghorn Breeding Line

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The aim of the present study is to demonstrate the efficient transfer of a specific monogenic trait maintained in gene bank into a contemporary high performing white egg layer chicken line. The project is part of the EU project IMAGE (Innovative Management of Genetic Resources) under the umbrella of Horizon 2020. The trait of interest, blue eggshell color is inherited in a dominant way and the causal mutation is a large insertion on chromosome 1 upstream of *SLCO1B3* (Wang et al. 2013, Wragg et al., 2013). In 2016, six Araucana cocks were mated with ten White Leghorn (WL) hens. Two marker-assisted backcross generations (BC1 and BC2) followed by an intercross-generation (IC) will be generated, aiming at a high performing homozygous blue layer WL-like line. Based on genotype data of the founder animals, we identified 24 highly informative SNPs on chromosome 1 bracketing the insertion site. Additionally 13 SNPs from a customized 52K SNP chip were suitable to distinguish between the Araucana and WL genome in this region. These markers were used to detect recombinant animals of BC1 that carried the blue eggshell mutation on the one hand and had highest content of WL genome on the other hand with regard to the inserted region on chromosome 1. Out of these recombinants, animals with the highest proportion of the recipient genome and the highest degree of diversity were selected for mating of the BC2. The IC is planned for end of 2019. Performance data of the BC1 and commercial WL were compared. Analysis of performance data of the BC2 is still under progress. The results are promising as the mean laying rate of BC1 animals (81.2 % in carriers and 83.6 % in non-carriers) was 5.4 % lower than in the commercial line (87.8 %). In BC1 animals, the eggshell strength was on average 40 N and significantly lower ($p < 0.0001$) compared to the commercial line (45 N). The mean egg weight was measured four times and was 61.6 g in BC1 hens and 62.2 g in the commercial line.