

# Marker-assisted Introgression of Blue Eggshell Color into a White Leghorn Line

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The objective of the present study is the demonstration of the efficient transfer of a specific monogenic trait maintained in gene bank, here blue egg shell color, into a contemporary high performing white egg layer chicken line by marker-assisted introgression. This project is part of the EU project IMAGE (Innovative Management of Genetic Resources). Blue eggshell color is inherited in a dominant way and is caused by 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. Using breed/line specific markers at the introgression locus recombinant BC1 animals were detected. 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 final IC is planned for end of 2019. Analysis of performance data of the BC1 and commercial WL revealed promising results. The mean laying rate of BC1 animals was 5.4 % lower than in the commercial line and measured 81.2 % in carriers and 83.6 % in non-carriers. The eggshell strength was on average 40 N in the BC1 and significantly lower than in WL (45 N). The mean egg weight of 61.6 g in BC1 hens was similar to the commercial line (62.2 g).

**Keywords:** chicken, marker-assisted, introgression, blue eggshell, White Leghorn

# A Genome-wide Association Study on The Egg Quality in Two-way Cross Chicken Population

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A genome-wide association study (GWAS) used a high-density genotyping platform represents a method for identifying genetic variations influencing various traits, and the GWAS is the newest tool being proposed to the poultry breeding industry for improvement of animal agricultural species. The object of this study was to find the significant and suggestive single nucleotide polymorphism (SNP) which should influence the traits of the egg quality. We used the F2 population of 743 individuals produced by crossing the Taiwan country chicken L2 line with and experimental line of Rhode Island Red layer R- provided by INRA in 2003. Total of 9 traits were analyzed which including egg weight (EW), egg color (L\*, a\*, b\*), eggshell strength (ES), yolk weight (YW), albumin height (AH), eggshell within membrane (EWM), eggshell without membrane (EOM), eggshell membrane thickness (EMT), and eggshell weight (ESW). The analysis was performed by using the Bayesian sparse linear mixed model (BSLMM) in software of GEMMA. The results showed that the trait of egg color L\* associated with GGaluGA000698 and rs14099457; the egg color a\* was associated with rs13746326, rs15409520 and GGaluGA000698; the ESW was associated with rs14480552, rs13764758 and GGaluGA082982. In conclusion of this study, the SNPs may be used to improve the egg quality trait in poultry breeding program.

**Keywords:** GWAS, egg quality traits, single nucleotide polymorphism

