SELECTION FOR GROWTH, SURVIVAL, AND DISEASE RESISTANCE IN PACIFIC WHITE SHRIMP (*Penaeus vannamei*)

Salazar, M., Bangera, R., Erazo, C.E., Suarez, C.A., Cock, J.H., Rye, M.

¹Benchmark Genetics, Cartagena, Colombia ²Benchmark Genetics, Bergen, Norway

Presenting author email address: marcela.salazar@bmkgenetics.com

Global shrimp production should surpass 4.5 MMT in 2022, with *Penaeus vannamei* being the main cultured marine shrimp. Industry profitability depends on the biomass (number and weight of the harvested shrimp). However, disease outbreaks such as Acute Hepatopancreatic Necrosis Disease (AHPND) and White Spot Syndrome Virus (WSSV) cause huge economic losses. These can be reduced if selection programs improve growth, survival, and disease resistance.

Benchmark Holdings owns the world's best documented pedigreed breeding program for *P. vannamei* in Cartagena, Colombia. Nucleus families have been selected for 20 generations for growth (HW), survival, and robustness in distinct environments, and resistance to major diseases. Eye-stalk ablation were replaced by natural maturation. Recently, parental assignment (PA), based on SNPs, was implemented to construct the pedigree and eliminate separate rearing of families and hence reduce the common environmental effects. These innovations provide better estimates of genetic parameters, greater selection precision and facilitate estimation of genotype by environment interactions (GxE). Heritability for HW at low salinity was 0.36 ± 0.02 and at high salinity was 0.49 ± 0.15 . Heritability for survival was 0.17 ± 0.01 , for resistance to AHPND (0.39 ± 0.06), and to WSSV 0.11 ± 0.02 . There was a negative genetic correlation between Growth and WSSV resistance (-0.41), which may reflect the metabolic changes in the host associated with WSSV resistance. Recently, WSSV and AHPND resistance breeding advanced from mass selectin to genomic selection (GS). The constant evolution of the program indicates how modernization of breeding methodologies ensures industry profitability.