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Changes of heritability and genetic correlations in production traits over time in red abalone (*Haliotis rufescens*) under culture

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Abstract

Red abalone *Haliotis rufescens* is one of the most valuable mollusks in the international market, but it has a low growth rate. A breeding program is being developed to increase its growth rate in Chile. We estimated the changes in direct heritability (h^2), maternal/common environments heritability (m^2) and genetic correlations (r_G) of growth traits (shell length and width, total mass, flesh mass and foot protein as an indicator of meat quality) measured during 2 years (every 4 months) from the juvenile stage (27 months) to the adult harvesting age (51 months), in 60 full-sib red abalone families. Heritabilities for growth traits measured in juveniles and young adults (27–35 months of age), were low (0.07–0.17) and not significant. Initial low h^2 were associated with significant amounts of maternal/common environmental effects ($m^2 = 0.4$). In young adults and abalone near the harvest age (39–51 months of age) h^2 were much higher (0.32–0.75). These results emphasize the importance of multiple estimations of h^2 over time.

Among meat quality traits, only the h^2 for the flesh mass for adults at harvesting age was significant (0.15). We observed strong positive r_G (>0.9) between shell sizes (easy to measure) and total and flesh masses (trait more related to market value than shell sizes but harder to measure) for adults at harvesting age. Thus, if the 5% largest 51 month old abalone were selected from the population as broodstock we expect a positively correlated response on flesh mass of 23.4%.