



Repeatability of physiological traits in juvenile Pacific abalone, *Haliotis discus hannai*

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Abstract Several studies on individual physiological traits assume that past records may predict future performance. Marine mollusks, as other animals, show a wide range of between- and within-individual variation of physiological traits. However, in this group, almost nothing is known about the relative influence of genetic factors on that variation. Repeatability (R) is a measure of the consistency of the variation of a trait, which includes its genetic variance and represents the maximum potential value of its heritability (h^2). Traits that show high inter-individual variation and high repeatability levels could potentially evolve through selection (natural or artificial). We estimated the repeatability [using intra-class (τ) and Pearson-moment (r) correlation coefficients] of several physiological traits related to energy acquisition and allocation in juvenile Pacific abalone *Haliotis discus hannai*, maintained under controlled environment growing systems. In order to estimate the range of the R values and the effect of the time elapsed between measurements on these estimates, we measured these traits monthly during 6 months for each individual. Among the physiological traits, those related to energy allocation like oxygen consumption (standard metabolic rate, SMR) and ammonium excretion

rates, and oxygen/nitrogen ratio (O/N), showed intermediate levels of repeatability (0.48, 0.55 and 0.39, respectively), when this was estimated by τ coefficient. However, the r estimation showed that SMR and O/N repeatability were significant and high (0.6–0.7 and 0.5–0.7, respectively) during the first 5 consecutive measurements, decreasing strongly (0.3 and 0.2, respectively) during the last measurement. For ammonia excretion, although repeatability (r) decreased from 0.8 to 0.5 during the 6 consecutive measurements, they remain significant during the experimental period. Therefore, our results indicate that for *H. discus hannai* juveniles, physiological traits like SMR, ammonia excretion and O/N are significantly repeatable (i.e. good predictors of future measurements) during a period of 4–5 months. These significant repeatability values suggest an important genetic control upon the phenotypic variation of these physiological traits, and could potentially respond to natural or artificial selection, and be used in genetic improvement programs. By contrast, those traits related to energy acquisition (i.e. ingestion, absorption and assimilation) and physiological efficiencies (i.e. net growth and scope for growth) showed very low levels of repeatability (0–0.07). This indicates that the phenotypic variation of these traits would be more influenced by environment rather than by genetic factors.

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