HERITABILITY OF COPING STYLES IN FARMED EUROPEAN SEABASS

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The characterization of the behavioural and physiological response strategies, defined as coping style, is expected to bring new keys for the sustainable development of aquaculture, in enhancing animal welfare, reducing disease susceptibility, and more directly improving production performances. To understand the genetic basis of personality traits and reactions to a stressful or challenging situation in European sea bass (*Dicentrarchus labrax*), families from a full factorial mating (10 females x 50 males) were reared in common garden and individually tagged at an early age (95 days post hatching, dph) using microtags. Parentage assignment was performed with VITASSIGN using 12 microsatellite markers, resulting in 1308 uniquely assigned fish. The coping style of the animals was characterized through behaviour based tests at four different ages, categorizing fish into proactive or reactive: a hypoxia avoidance test (at 255 dph) and 3 risk-taking tests (at 276, 286 and 304 dph). We observed significant heritability of the coping style, higher for the average of risk-taking scores (h^2 = 0.42±0.12) than for the hypoxia test (h^2 = 0.23±0.10). The genetic correlation between the three risk-taking scores was very high (r_A = 0.99 – 1) showing that although their repeatability was moderately high (r_P = 0.66-0.73), successive risk-taking tests evaluated the same genetic variation. A mild genetic correlation between hypoxia avoidance and the average risk-taking score (0.43±0.21) suggested that hypoxia and risk-taking tests do not address exactly the same behavioural and physiological responses. In addition, significant genetic correlations were observed between coping styles and phenotypic traits, particularly between hypoxia avoidance and thermal growth coefficients (r_A -0.45 – -0.55), showing that reactive fish have a higher growth than proactive fish under our experimental conditions. To a lesser extent, higher growth performances of reactive fish were also observed suggested by the genetic correlation between thermal growth coefficient and risk taking score (r_A -0.12 – -0.23). This study, part of the EU project COPEWELL (FP7), suggests that the use of coping style characterization could represent an additional tool to improve the domestication process, selecting individuals better adapted to farming conditions, but also showing higher growth performances.

Keywords: coping style, behavior, heritability, growth

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