Understanding the population structure and reproductive behavior of hatchery-produced yellowtail kingfish (Seriola lalandi)

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Abstract

The yellowtail kingfish (Seriola lalandi) is a marine endemic fish, and a key species in the national programme for the diversification of Chilean aquaculture. Since it has been recently developed from wild fish, the biology of this species under production is to a large extent unknown. For example, the structure of the different populations used to create the national breeding programme is not well characterised. Moreover, due to the fact that it is not possible to perform stripping of broodstock in yellowtail kingfish, the genetic contributions of individuals are affected by the reproductive behaviour of this species. To increase our knowledge of the biology of this species under aquaculture conditions, the objectives of this study were: (i) to identify the population structures of wild and commercial populations of yellowtail kingfish obtained from different fisheries off the Chilean coast, and compare these to those of Mexican and Australian specimens and (ii) to study the reproductive behaviour of commercial yellowtail kingfish broodstock through paternity testing, to estimate the genetic contributions of individuals throughout the artificial spawning season in captivity. We used a set of 12 highly informative microsatellite markers optimised for paternity testing. The analysis of the population structure showed at least two clusters of yellowtail kingfish, including a single metapopulation from Chile and Australia (possibly explained by the migratory behaviour of this species in the Pacific Ocean), and the other from Mexico (which is most likely composed of California yellowtail, S. dorsalis). Some degree of admixture, albeit small, was observed between the populations from Mexico and Australia. Paternity analysis showed that the average ratio (male/female) contributing in a spawning event was 2.6, confirming the spawning behaviour observed in other species in this genus. Additionally, we observed that males participated in matings regularly during the whole spawning season. Using the results of this research, we recommend modifying the current implementation of yellowtail kingfish breeding programmes to reduce the effects of random genetic drift. This can be achieved by managing the genetic contributions of broodstock in a two-step breeding programme. This study provides useful genetic information for the long-term development and management of the Chilean yellowtail kingfish industry, which involves a species of high importance for the diversification of Chilean aquaculture.

Palabras clave

Palabras clave de autor: Seriola lalandi; Paternity analysis; Population structure; Genetic contributions

KeyWords Plus:SOFTWARE; AQUACULTURE; INFERENCE; AMBERJACK; PROGRAM; WILD

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