

Prediction of Fillet Weight and Fillet Yield from Body Measurements and Genetic Parameters in a Complete Diallel Cross of Three Nile Tilapia (*Oreochromis niloticus*) Strains

Authors : Kassaye Balkew Workagegn, Gunnar Klemetsdal, Hans Magnus Gjøen

Abstract : In this study, the first objective was to investigate whether non-lethal or non-invasive methods, utilizing body measurements, could be used to efficiently predict fillet weight and fillet yield for a complete diallel cross of three Nile tilapia (*Oreochromis niloticus*) strains collected from three Ethiopian Rift Valley lakes, Lakes Ziway, Koka and Chamo. The second objective was to estimate heritability of body weight, actual and predicted fillet traits, as well as genetic correlations between these traits. A third goal was to estimate additive, reciprocal, and heterosis effects for body weight and the various fillet traits. As in females, early sexual maturation was widespread, only 958 male fish from 81 full-sib families were used, both for the prediction of fillet traits and in genetic analysis. The prediction equations from body measurements were established by forward regression analysis, choosing models with the least predicted residual error sums of squares (PRESS). The results revealed that body measurements on live Nile tilapia is well suited to predict fillet weight but not fillet yield ($R^2 = 0.945$ and 0.209 , respectively), but both models were seemingly unbiased. The genetic analyses were carried out with bivariate, multibreed models. Body weight, fillet weight, and predicted fillet weight were all estimated with a heritability ranged from 0.23 to 0.28 , and with genetic correlations close to one. Contrary, fillet yield was only to a minor degree heritable (0.05), while predicted fillet yield obtained a heritability of 0.19 , being a resultant of two body weight variables known to have high heritability. The latter trait was estimated with genetic correlations to body weight and fillet weight traits larger than 0.82 . No significant differences among strains were found for their additive genetic, reciprocal, or heterosis effects, while total heterosis effects were estimated as positive and significant ($P < 0.05$). As a conclusion, prediction of prediction of fillet weight based on body measurements is possible, but not for fillet yield.

Keywords : additive, fillet traits, genetic correlation, heritability, heterosis, prediction, reciprocal

Conference Title : ICFA 2023 : International Conference on Fisheries and Aquaculture

Conference Location : Oslo, Norway

Conference Dates : June 22-23, 2023