Determining Variability, Confidence, and Statistical Power in Aquaculture Experiments

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Abstract
This article deals with the lack of appreciation among marine biologists of basic statistics in aquaculture experiments. Topics include calculation of sources of variation, the importance of true replication rather than pseudo-replication to test for treatment effects, estimation and visualization of the confidence of an experimental design used in feeding trials, and calculation of its statistical power. An arbitrary example is used to illustrate how the described theory can be applied in practice. The approach demonstrates that nutritional experiments with a reduced number of tanks can be a valid strategy as long as certain experimental considerations are taken into account. In addition, it shows that information on the relative sizes of ‘between’ and ‘within’ sources of variation can be used to design more efficient experiments by minimizing the effects of the stronger sources of variance. The approaches used in this article are applicable to large and small-scale experiments.

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