

Accepted Manuscript



Title: A Behavioural Sensor for Fish Stress

Authors: Yitzhak Simon, Berta Levavi-Sivan, Avigdor Cahaner, Gideon Hulata, Aaron Antler, Lavi Rozenfeld, Ilan Halachmi

PII: S0144-8609(16)30211-4
DOI: <http://dx.doi.org/doi:10.1016/j.aquaeng.2017.04.001>
Reference: AQUE 1896

To appear in: *Aquacultural Engineering*

Received date: 22-11-2016
Revised date: 1-4-2017
Accepted date: 3-4-2017

Please cite this article as: Simon, Yitzhak, Levavi-Sivan, Berta, Cahaner, Avigdor, Hulata, Gideon, Antler, Aaron, Rozenfeld, Lavi, Halachmi, Ilan, A Behavioural Sensor for Fish Stress. *Aquacultural Engineering* <http://dx.doi.org/10.1016/j.aquaeng.2017.04.001>

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A Behavioural Sensor for Fish Stress

Yitzhak Simon ^a, Berta Levavi-Sivan ^a, Avigdor Cahaner ^a, Gideon Hulata ^b, Aaron Antler^b, Lavi Rozenfeld, ^b Ilan Halachmi ^{b*}

^a Department of Animal Sciences, The Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Rehovot 7610001, Israel

^b Israel Agricultural Research Organization, The Volcani Center, P.O. Box 6, Bet Dagan 50250, Israel

* Corresponding author: E-mail: halachmi@volcani.agri.gov.il

Abstract

Due to water turbidity, fish stress might be difficult to observe. Evaluation of fish stress by blood sampling requires removing a fish from the water, which is in itself a stressful event. Therefore, we designed and built a sensor to detect fish behaviour that reflects stress. The electronic sensor detected early signs of fish stress by scoring the fish's inactivity. LEDs and detectors are embedded on a steel wand that is held underwater by an operator. In this preliminary (feasibility) study, the new sensor was validated for Tilapia (*Cichlidae*) and Hybrid Striped Bass (*Morone*). We induced stressful situations in the fish tanks by manipulating oxygen and temperature levels. Results: Lowering the temperature and oxygen levels both significantly increased the average number of signals identified by the sensor, which indicate stress. The effect of reducing water temperature from 24° C to 15° C was three times stronger than was the effect of lowering the oxygen saturation level from 85% to 50%. The difference in the number of signals between the good and stressful conditions was statistically significant, amounting to approximately eight sensor signals, 10.57 compared to 2.49 respectively. Lowering the temperature increased the mean number of signals by 5.85 and 6.06 at 85% and 50% oxygen saturation respectively, whereas lowering oxygen levels increased the mean number of signals by 2.02 and 2.23 at 24° C and 15° C,

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