Stocking Density Induced Stress on Plasma Cortisol and Whole Blood Glucose Concentration in Nile Tilapia Fish ( Oreochromis niloticus ) of Lake Victoria, Kenya


## Abstract

Effects of high stocking densities (HSDs) were evaluated for Nile tilapia fish (*Oreochromis niloticus*) under culture to determine its influence on plasma cortisol and whole blood glucose concentration. Plasma cortisol levels (ng/ml) were assayed by *E*nzyme-*L*inked *I*mmunosorbent *A*ssay (ELISA). Whole blood glucose levels were determined using a hand-held one touch ultraglucose meter (MD-300) and test strips. Plasma cortisol and whole blood glucose level determinations were replicated three times for *O. niloticus* reared under both low stocking densities (LSD) and HSD. One way Analysis of Variance (ANOVA) was performed on the data collected, and comparison of significant differences in means was carried out between LSD and HSD at 0.01%. Plasma cortisol levels revealed statistically () significant values of HSD at $6.32 \pm 1.06$ ng/ml than in LSD at $4.62 \pm 1.58$ ng/ml for the *O. niloticus* groups studied. Whole blood glucose analysis revealed a statistical () difference in the means in HSD and LSD *O. niloticus* groups ($F_{(df,1;\ 8)} = 7.946 > F_{crit} = 4.414$; ). Mean plasma glucose concentration was statistically () higher for HSD than LSD *O. niloticus* groups at mean $\pm$ SD, $96.84 \pm 5.28$ and $76.82 \pm 5.92$, respectively. The findings of this study demonstrate that high stocking densities increase both cortisol and whole blood glucose concentration in tilapia fish, indicating a marked increase in stress levels. Elevated plasma cortisol and whole blood glucose concentration can be used as biomarkers for acute stress in *O. niloticus* produced under aquaculture systems. The findings of this study can help inform policy on the management of stress caused by overstocking of *O. niloticus* and other related Cichlids under industrial aquaculture production.



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