

**THE EFFECT OF SALINITY ON FOOD CONSUMPTION AND  
GROWTH OF NILE TILAPIA (*OREOCHROMIS NILOTICUS* L.)**

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**EXTENDED ABSTRACT ONLY - DO NOT CITE**

**Introduction**

To date there is little information available explaining the effects of salinity on food consumption and individual growth performance of brackishwater fish including Nile tilapia (*O. niloticus*). When individual food consumption rates are known it is possible to examine the feeding behaviour of fish and to compare the nutritional status of an individual fish with its physiological performance. In recent years, X- radiography has been used to measure food consumption rates of individual fish under a variety of experimental conditions (Talbot and Higgins, 1983; Stead, *et.al.*, 1999). Hence, the aims of this study were: (i) to identify the optimum salinity for growth performance of *O. niloticus* and (ii) to compare the interrelationships between individual estimates for food consumption, growth rate and protein content of *O. niloticus* under different salinities.

**Materials and Methods**

The experiment commenced on 19 June 1998, for a duration of 75 days at the Dept. of Zoology, University of Aberdeen. Three treatments (salinity) with two replicates for each salinity T<sub>1</sub> (freshwater 0 ‰), T<sub>2</sub> (10 ‰) and T<sub>3</sub> (20 ‰) were

maintained by adding crude salt with recirculated, filtered aerated freshwater. All the treatments were stocked with the same size fish (average length and weight,  $8.5 \pm 0.24$  cm and  $9.94 \pm 0.15$  g, respectively) at the rate of 20 fingerlings per tank. Before stocking in the experimental tanks, fish were anaesthetised and individually freeze branded by using a number of combinations of brand marks on one lateral side. The fish were hand-fed (45% protein) at the rate of 2% bw. day<sup>-1</sup>. A starvation experiment was conducted on three groups of fish (n=20) maintained at different salinities.

#### *Measurements of individual food consumption*

Individual food consumption was measured using a modified version of the X-radiography technique as used by Stead *et.al.*, (1999).

#### *Measurement of protein content*

At the end of the experiment, protein content of white muscle in each fish were measured, following the method described by Lowry *et al.*, (1951).

### **Results**

- Nile tilapia *O. niloticus* reared in different salinities (freshwater 0, 10 & 20 ‰) and fed the same ration level (2% bw. day<sup>-1</sup>), showed no significant differences in specific growth rates, food consumption rates and food conversion ratios between and within the treatments (Fig. 1).
- Protein content in white muscle of individual fish were not significantly different between salinity groups (Fig.1b).
- No significant relationships were observed between individual specific growth rates and food consumption rates in the treatment (salinities) groups (Fig. 2a & 2b). A significant ( $P < 0.05$ ) negative correlation were observed between individual SGRs and FCRs for all fish (Fig. 2a & 2c).
- During the starvation experiment for control fish, weight loss (SGR % day<sup>-1</sup>) was similar in all treatments and the effects of starvation on weight loss did not differ significantly between salinities (0, 10 and 20

‰) (Fig. 1c). After 7 days of starvation, more than 50% of the fish at the highest salinity (20 ‰) developed body lesions which covered 5-25% of their body surface possibly due to a higher osmoregulatory cost at the higher salinity (20 ‰).

- In all salinities (0, 10 and 20 ‰), fish in the present study were observed to exhibit aggressive behaviour when feeding and it is possible that the 2% bw. day<sup>-1</sup> ration level was a restricted level for the *O. niloticus* fingerlings.

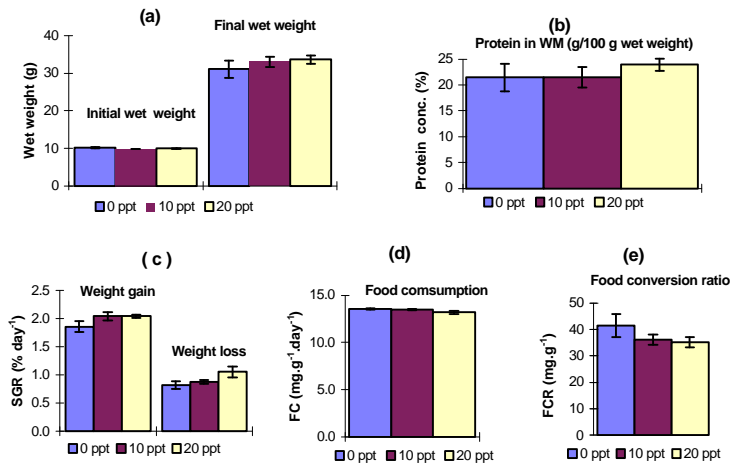


Figure 1: Comparisons of Tilapia growth under different salinity during the experimental period.

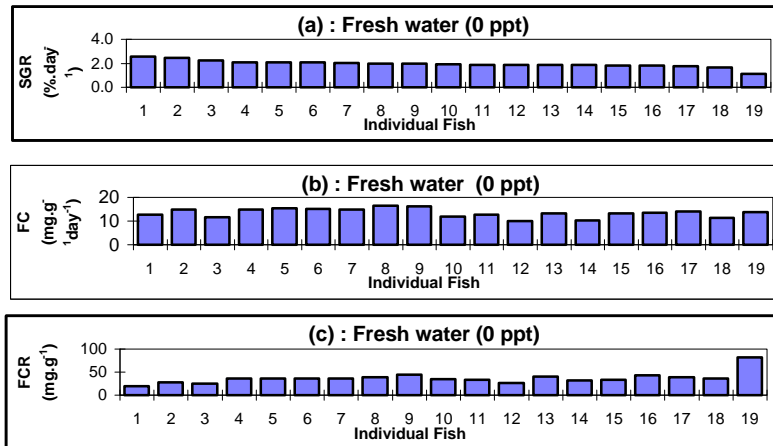


Figure 2: Relationships between SGR, FC and FCR for fish in freshwater (0‰). Individual SGR are ranked in descending order (a) and the respective FC are plotted directly below for each corresponding fish (b) and similarly for FCR (c).

## Conclusion

Although changes in salinity (0, 10 and 20‰) did not appear to have a significant effect on growth performance of *O. niloticus*, the results reported the complexity of the interrelationships of food consumption and growth rate with salinity. Further experiments are required to establish unequivocally the mechanisms, which are involved in the regulation of a response in *O. niloticus* to salinity.

## References

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