

**USE OF COMPENSATORY GROWTH RESPONSE
OF FISH TO ENVIRONMENTAL CHANGES TO
IMPROVE FISH CULTURE OPERATIONS**

By

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B.Sc. Agric. Sc. (Animal Production and Fish Resources), Suez Canal Univ. (2010)

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ABSTRACT

Aya Arafat Youssef Mohammed. Use of compensatory growth response of fish to environmental changes to improve intensive fish culture operations. Unpublished M.Sc. Thesis, Animal Breeding Department, Faculty of Agriculture, Ain Shams University, 2018.

Nutrition is the most expensive item in aquaculture production it is often increased to more than 70% of the total variable costs depending on the culture density. Nutrition costs may be significantly reduced by decreasing feeding days per week. The present study aims to investigate compensatory growth of Nile Tilapia *Oreochromis niloticus* in structural size and live weight in response to different deprivation periods and re-feeding. This study was conducted in Fish Research Central (FRC), Faculty of Agriculture, Suez Canal University, Ismailia, Egypt.

Four treatments were evaluated. The control group was fed to satiation two times a day and one day starvation and re-feeding six days throughout the experiment. The other three treatment groups were starved for 2, 3 and 4 days and re-feeding 7, 11 and 14 days, respectively. *O. niloticus* were constructed in two experiments with initial primary weights of 21.62 ± 0.08 g, 25.00 ± 0.05 g for the first and the second experiments, respectively. Fish were randomly fed twice daily and starved for four days and were constructed for fourteen days in three replicates to assess the cost of feeding, growth performance, feed use and survival rate for 84 days in 24 fiberglass tanks.

The results showed that the best final body weight and feed conversion ratio in feeding regime system 3/11 compered the control and feed restriction significantly ($P < 0.05$) reduced the cost of feed. The lowest feeding cost was obtained by *O. niloticus* fish starved for three days compared to starved for two days, four days and feed twice daily. The cost of feeding was reduced by 30% when the feeding limited to

three days starving and re-fed eleven days compared with those fed six days and starved one day in two the experiments.

Keywords: Feeding regime, Deprivation, Starvation, Compensatory growth, *Oreochromis niloticus*.

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LIST OF ABBREVIATION

Compensatory growth	CG
Growth over compensation	GOC
American Public Health Association	APHA
Lean body mass	LBM
Different energy dietary	DED
Dissolved oxygen	DO
Initial body weight	IBW
Final body weight	FBW
Weight gain	WG
Specific growth rate	SGR
Feed conversion ratio	FCR
Protein efficiency ratio	PER
Protein productive value	PPV
Condition factor	K
Compensation coefficient	CC
Low stocking density	LSD
Feeding regime system	FRS
Incidence cost	IC
Profit index	PI

INTRODUCTION

Feed is the most expensive component of aquaculture enterprise, accounting more than 60% of the operating cost depending on the intensity of fish production (**Marimuthu *et al.*, 2010** and **El-Sayed, 1999**). Therefore successful cultured fish production requires availability of running cost and optimal feeding practices to ensure the best growth rates and feed efficiencies (**Gao and lee, 2012**). Nile tilapia, *Oreochromis niloticus*, is one of the most popular and widely cultured species globally. Its feeding usually involves two or more meals per day which further increases the feeding cost. Unfortunately, many Nile tilapia farmers especially in developing countries don't have enough incomes and knowledge of feeding their fish. This scarcity of incomes coupled with low price of the cultured *O. niloticus* in the local markets have weakened the development of its production.

One potential way of reducing feed cost is to take advantage of the compensatory growth that is usually decrease feeding days. It is a phase of fast growth which occurs after the re-feeding of fish following a period of feed deprivation or after abnormal conditions (**Dobson *et al.*, 1984**); or increase in appetite (**Abdel-Hakim *et al.*, 2009**); an accelerated growth rate induced through a period of resources restriction (**Nicieza and Alvarez, 2009**). The compensatory growth may identify as hyperphagia usually elevate appetite of fish and encourage them to consume more feed (**Tian and Qin, 2004; Cho *et al.*, 2006 and Cho, 2011**). Starvation and re-feeding resulted in a rapid growth rate of fish and reduction of nutrient intake (**Mattila *et al.*, 2009**) these led to reduce feed costs as well as proper feed management. Compensatory growth has been applied for many fish cultured species including European minnow carp, *phoxinus phoxinus* (**Russell *et al.*, 1996**); hybrid tilapia, *O. mossambicus* X *O. niloticus* (**Wang *et al.*, 2000**); Atlantic salmon, *Salmo Sular*, (**Johansen *et al.*, 2001**). However, the full compensatory growth