DETERMINATION OF NUTRITIONAL REQUIREMENTS OF SOME ESSENTIAL AMINO ACIDS FOR TILAPIA FISH AND ITS IMPACT ON ITS ENVIRONMENT

By

Khaled Mohamed Wasly

B.Sc. Agric. Sci. (Animal Production), Ain Shams University, 1996

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Sciences

Department of Agricultural Science

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2007

تحديد الاحتياجات الغذائية من بعض الأحماض الأمينية الأساسية لأسماك البلطي و تآثيرها علي بيئتها

رسالة مقدمة من

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ABSTRACT

The present study was carried out in the fish laboratory of the Central Laboratory for Food and Feeds - Agriculture Research Center and was designed to determine the optimal level of methionine and lysine in tilapia fingerling diets; especially when using plant protein as the main protein source. Six experimental groups and a control treatment were assigned to one of the methionine or lysine level. The control group contained methionine and lysine levels which were recommended by **Santiago and Lovell (1988).** All experimental diets were isonitrogenus (30% crude protein) and isocaloric (430 kcal / 100 g diet). Four dietary treatments with ascending levels of methionine (2.02, 2.72 (control), 3.45 and 4.11 g / 100 g crude protein), and varying levels of lysine (3.93, 5.12 (control), 6.2 and 7.87 g/ 100 g crude protein) were formulated. The seven tested diets were fed to 7 tilapia fingerling groups with initial weight of 1.25 g / fish. Each experimental group consisted of 3 aquaria. The experiment (1) duration was 14 weeks and the fish were fed at a rate of 3.5% of fish body weight daily. The daily allowances were fed at 5 meals. Results in terms of the highest final body weight, weight gain, specific growth rate and best feed conversion and protein efficiency and feed utilization showed that tilapia fingerlings require 2.72 g methionine and 5.12 g lysine / 100 g crude protein. Quadratic regression analysis of weight gain (%) against dietary methionine and lysine levels indicated that the optimal dietary methionine and lysine levels required for maximum growth was determined to be 3.05 % and 5.69 % of the dietary protein diet in the presence of 1.25 % cystine of the dietary protein diet, respectively. The experiment (2) was done in order to study the effect of different treatments on *Oreochromis niloticus* water environment, by using the same experimental diets used in experiment (1). The ammonia, nitrite and nitrate concentration (mg/l) of water, for the fish given diets containing different levels of both methionine and lysine, were significantly lower ($P<0.05$) for fish fed the control diet compared with the fish fed diets contained higher methionine and lysine levels, while were not significantly different ($P >0.05$) with the fish fed diets contained lower methionine and lysine levels. The pH value among the experimental fish groups were not significantly different ($P>0.05$). The results of the present study showed that the dietary requirements of methionine and lysine for tilapia fingerlings were 3.05% and 5.69% of the dietary crude protein, respectively.

***Key words*:** Nile tilapia, nutritional requirements, methionine, lysine, water quality.

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SYMBOLS LIST OF SCIENTIFIC TERMS AND ABBREVIATION

ADG	Average Daily Gain
BW	Body weight
Ca	Calcium
CP	Crude protein
d	Day
DC	Digestible carbohydrate
DM	Dry matter
DO	Dissolved Oxygen
E	Energy
EE	Ether Extract
FCE	Feed conversion efficiency
FCR	Feed Conversion Ratio
Fig.	Figure
g	gram
GE	Gross energy
HCL	Hydrochloric acid
I.U.	International unit
K	Potassium
Kcal	kilo calorie
kg	kilogram

l	liter
Ln	Natural Logaritm
ME	Metabolizable energy
mg	milligram
MSO	Methionine Sulphoxide
N	Nitrogen
Na	Sodium
NFE	Nitrogen Free Extract
NH_3	Ammonia
NO_2	Nitrite
NO_3	Nitrate
O.	*Oreochromis*
P	Phosphorus
PER	Protein efficiency ratio
P:E	protein energy ratio
pH	Hydrogen ions concentration
PPV %	Protein Productive Value
SGR	Specific growth rate (%/day)
T.	Tilapia
TAN	Total Ammonia Nitrogen
Vit. & Min.	Vitamins and Minerals Premix

W	weight
W0	Initial weight (g/fish)
W1	Final weight (g/fish)

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