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SOME INVESTIGATIONS ON A CHRONIC EYE AFFECTION SYNDROME ASSOCIATED WITH EXTENDED MORTALITY IN AN INTENSIVE FISH FARM

(With 2 Tables and 2 Figures)

By

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دراسة لمشكلة النفوق المستمر لإصابة العين المزمنة في مزرعة أسماك مكثفة

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تمت هذه الدراسة لمشكلة النفوق المستمر وإصابة العين المزمنة في إحدى مزارع البلطي المكثف في مصر حيث تم رصد الأعراض الخارجية والداخلية للأسماك التي أظهرت أعراض إكلينيكية ، وكذلك تم الفحص البكتيري للأسماك المصابة والسليمة . كما تم تحليل عينات من الأعلاف المقدمة للأسماك وعينات من مياه الأحواض. أظهرت نتائج الفحص البكتيري أنه توجد إصابات بكتيرية مرضية محددة ، كما لم تظهر نتائج تحليل العلف أي نقص في المكونات المطلوبة لأسماك البلطي النيلي ، بينما أظهرت نتائج تحليل المياه إرتفاع نسبة الأمونيا الغير مؤنثه أكثر من الحدود المسموح بها مما يؤكد علاقتها بهذه المشكلة.

SUMMARY

This study conducted toward a problem of extended mortality and chronic eye affection in an intensive *Oreochromus niloticus* farm in Egypt. External examination of fish revealed that the affected fish was sluggish in movement, some with haemorrhagic eyes, others with uni or bilateral exophthalmia or excavated eyes. Also the eyes of some fish are covered by whitish membrane. The internal examination of fish showed no characteristic lesions. Bacterial isolation from the internal organs (liver, kidney and spleen) were negative for specific fish pathogens.

Samples from the ration were analyzed for their chemical composition and the results revealed that the ration covered the requirement of *Oreochromus niloticus*. The results of water analysis showed that the level of unionized ammonia (1.77 mg/L) was far away from the maximum accepted level (0.02mg/L) which could be responsible for this problem. In conclusion, the results obtained in this work necessitate the application and maintenance of good environmental conditions in intensive fish farms to avoid drastic economical losses either from mortalities or low growth rate of culturd fish. For ammonia specifically, feeds must be given in the recommended feeding level to avoid their accumulation, putrefaction and the releasing of ammonia. Also if the water is reused, oxygenation of water isn't enough, but the treatment should include mechanical filter to remove suspended solids and biological filter for removal of dissolved metabolites with major concern in the nitrification of ammonia.

Key words: *Chronic eye affection, fish.*

INTRODUCTION

In the nearest decades, man was obtaining fish from fishing wild stock, but now this situation have been changed because fishing of wild stock becomes more expensive and harder to obtaine as well as depletion of many stock in natural resources due to pollution.

Due to these factors, culturing of fish was encouraged which now distributed all over the world in order to cover the shortage in animal protein. Many systems of culturing have been applied depending on the fish density (extensive, semi-intensive and intensive systems) (El-Bana and Abd-Elhamid, 2001).

As the intensity of culture increases, problems associated with crowding tend to increase, disease epizootics, water quality deterioration, competition for feed and in certain cases cannibalism. So greater control must be applied by the aquaculturist as the intensity of culture is elevated (Sharif and Prasad, 2000).

In Egypt the semi–intensive culture constitutes the main fish culture system, but now high intensity of fish culture systems have been developed.

A serious problem was noticed in an intensive fish farm in Egypt which extended as a chronic problem involved Nile tilapia *(Oreochromus niloticus)* and manifested by extended course of low mortality, with characteristic abnormal signs manifested particularly in

the eyes as hemorrhages, whitish membrane in the eyes of some fishes. Latter on progression of the case resulted in uni or bilateral loss of the eye followed by death of affected fishes. Also general signs of retarded growth were apparent.

The history indicated that Oxytetracycline and Flumequine were given without sensitivity test at their recommended dose but no progress was noticed.

The aim of this work is to manipulate the eye affection and mortality syndrome from the following aspects:

- investigation of the moribund fish clinically.
- Isolation and identification of the most probable bacterial cause.
- Evaluation of the aquatic parameters and the fish diets as ecological factors.

MATERIAL and METHODS

1- Fish sample:

A total number (35) of *Oreochromus niloticus* showing sluggish movement associated with characteristic abnormal signs manifested particularly in the eyes as hemorrhages, whitish membrane, uni or bilateral exophthalmia or excavated eyes were taken for external and internal examination according to (Post, 1987}. Also samples from the kidney,liver and spleen were taken for bacterial isolation on brain heart infusion agar medium (BHIA) according to (Austin and Austin, 1989).

2- Ration analysis:

Samples from the pelleted ration were analyzed to evaluate the quality and feed ingredients according to (*Harris and Loesecke 1960).*

3- Water samples:

The examination of water samples was focused on certain parameters (dissolved oxygen, pH, ammonia (NH_3), salinity, nitrate (No_3), nitrite (No_2) and temperature) which is important for the health condition of fish. The samples were taken and examined according to (APHA, 1989).

RESULTS

1- Examination of fish samples:

a- External and internal examination: External examination revealed that the affected fish was sluggish in movement, some fishes with protruded haemoragic eyes Fig. (1), others with uni or bilateral exophthalmia or excavated eyes. Also the eyes of some

fishes were covered by whitish membrane Fig. (2). The internal examination of fish showed that there was no characteristic lesion.

b- **Bacterial examination:** The results of bacteriological examination for swabs taken from the internal organs (liver, kidney and spleen) were negative for specific fish pathogens.

2- Examination of pelleted ration:

Analysis of samples taken from the pelleted ration, which is prepared in the same farm, revealed the chemical composition given in Tables (1).

Table 1

Proximate analysis	Weight percent
Crude protein	22%
Crude fat	3.4%
Crude fiber	4.1
Moisture	6%
Vitamins	mg|kg
Thiamin	4.7
Riboflavin	22.5
Pyridoxine	24.1
Folic acid	11.0
Pantothenic acid	59
Ascorbic acid	100

3- Examination of water samples:

The examination of the under ground water supplying this farm revealed the different parameters seen in Table (2).

Table 2

Water parameter	Result	Unit
Dissolved Oxygen	6.4	Mg/L
PH	7.6	
Ammonia (NH_3)	1.77	Mg/L
Salinity	1.1	Mg/L
Nitrate (No_3)	3.16	Mg/L
Nitrite (No_2)	0.04	Mg/L
Temperature	26	C^o

DISCUSSION

A problem of extended course of low mortality associated with chronic eye affection as a specific sign and low growth rate as general one were observed in *Oreochromis niloticus* cultured in an intensive fish farm.

The history of previous treatment of fish with Oxytetracycline at dose 55 mg/kg body weight in feeds for 10 days followed by Flumoquine 10% at dose 12 mg active ingredients/kg body weight daily in feeds did not give bitter results.

External and internal examination revealed the presence of various manifestations of chronic eye affection associated with extended low mortality and low growth rate with no characteristic internal lesions.

Trial for bacterial isolation were done in order to isolate a specific bacteria to apply sensitivity test and choose the best type of antibiotic to be given because the antibiotics given maynot the drug of choice but the results were negative for specific fish pathogens.

The chemical analysis of feed pillets used in this farm indicated that the chemical composition of this ration agree with the requirements of *Oreochromis niloticus* (Eleraky *et al.*, 1994 -Daniels and Gallagher 2000). The obtained results, exclude the probability of nutritional deficiency that arrised from the low growth rate and the various manifestations in the eye which commonly caused by the deficiency of some water soluble vitamins specially riboflavin (Lagler *et al.*, 1977-Mukhi *et al.*, 1999).

The examination of the water samples revealed that the parameters of water agree with the recommended parameters for *Oreochromis niloticus* except the level of unionized ammonia (1.77mg/L) which found far away from the maximum accepted limit which is 0.02 mg/L (Roberts, 1989). The alkaline pH(7.6) and the temperature of water (26 c) may act as a cofactor that increase the percentage of unionized ammonia which below pH(7) their amount considered negligible at any concentration of ammonia but above pH(7.5) its presence is always a potential danger to fish health (Roberts, 1989).

The low growth rate that manifested in this condition may resulted from the long term exposure of *Oreochromis niloticus* to the elevated ammonia level, which agree with (Smart, 1978; Cameron and Heisler, 1983; Cai and Summerfelt, 1992; Chen and Lai, 1992; Chen and Lin, 1992, Wajsbrot *et al.*, 1993; Noor-Hamid *et al.*, 1994; Rasmussen

and Korsgaard, 1996 and Gado 1998 and Harris *et al.*, 1998) but varied with the results recorded by (Adams *et al.*, 2001).

The various manifestations that observed in the eyes of affected fish might be the results of the irritating effect of the unionized ammonia which can readily diffused among exposed tissues (Sovbodova *et al.*, 1993).

In conclusion, the results obtained in this work necessitate the application and maintenance of good environmental conditions in intensive fish farms to avoid drastic economical losses either from mortalities or low growth rate of cultured fish. For ammonia specifically, feeds must be given in the recommended feeding level to avoid their accumulation, putrefaction and the releasing of ammonia. Also if the water is reused, oxygenation of water isn't enough, but the treatment should include mechanical filter to remove suspended solids and biological filter for removal of dissolved metabolites with major concern in the nitrification of ammonia.

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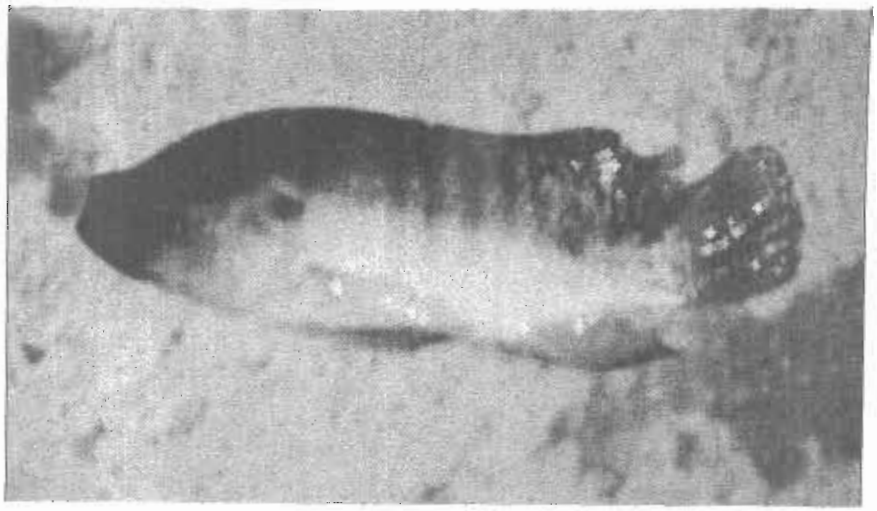

Fig. 1: *Oreochromis niloticus* with protruded haemorrhagic eye.

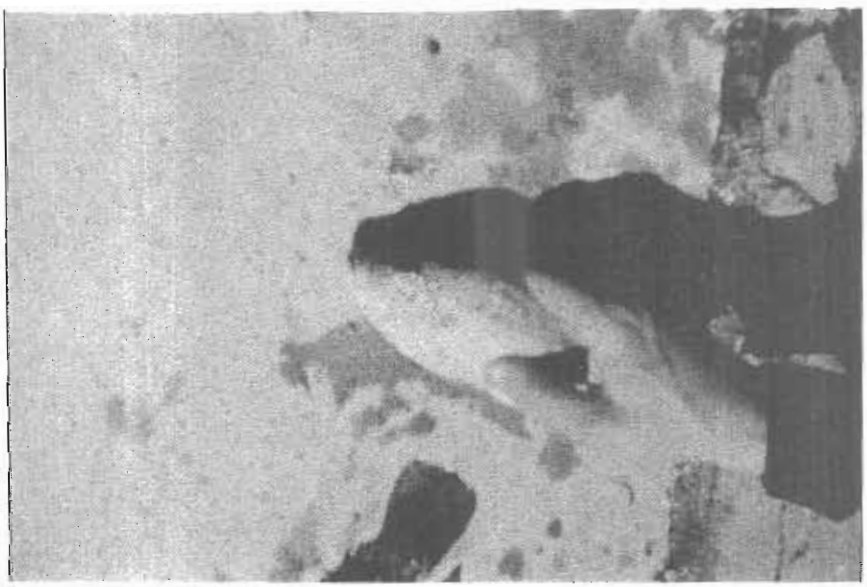

Fig. 2: Eye of *Oreochromis niloticus* covered by whitish membrane