

HYGIENIC STUDIES FOR CONTROL OF LERNEA INFESTATION IN CULTURED CARP FISH

BY

M.A., EL-BABLY*, M.M. ALY** AND I.A. EISSA***

* Dept. of Animal Hygiene, Management and Zoonose, Fac. of Vet. Med.,
Cairo University, Beni-Suef Branch

** Dept. of Animal Hygiene, Management and Zoonose, Fac. of Vet. Med., Cairo University

* Dept. of Poultry and Fish Disease, Fac. of Vet. Med., Suez Canal University

SUMMARY

An outbreak of ectoparasite infestation affected carp fish reared in ponds (10x 6x 3 m) belonging to Fac. of Vet. Med., Suez Canal University during the period from June to late September. Parasitological examination revealed high incidence of ectoparasite infestation among carp fishes reach up to 80 %. The crustacean copepode was identified as *Lernaeus* sp. Physical and chemical analysis of pond water indicated that, although the mean values of pH, temperature, dissolved oxygen, turbidity, ammonia and nitrite were relatively high, but they did not reach any harmful level on fish in pond. Trials for control of *Lernaeus* infestation was done through application of strict hygienic measures in pond in association with readjustment of all water quality parameters followed by adding of Metrophosphate (0.25 mg/L) of pond water for 7 successive days (first treatment). Then freshly prepared potassium permanganate was added to water to give final

concentration 0.25 mg/L (second treatment) was succeeded in reducing the infestation rate from 80 % to 10 % which in turn decreased into 5 % by adding of Monosex Tilapia (*O. niloticus*). The obtained results, indicates the importance of regular inspection of carp fish in ponds for early detection of ectoparasite infestation besides regular examination of different water parameters to monitor it's availability for fish rearing and removal of any harmful impurities.

INTRODUCTION

Under unfavourable maintenance conditions in intensive and semi-intensive pisciculture, the danger of epizootics by ectoparasites grows more and more serious and may lead to drastic economical losses in the cultured fishes through heavy infestations, less body gain and high mortality. From the most striking ectoparasitic affections, *Lernaeus* which considered a wide

spread problem facing warm fresh water fishes in tropical and subtropical environments (Paper- no, 1980, Post, 1987, El Gawady et al., 1992, Doroviskikh, 1993 and Noga, 1996). Fish are aquatic poikilothermic, their existence and performance are dominated by the quality of their environment. Poor water quality is detrimental to fish culture as any alteration in physico-chemical parameters of water beyond acceptable limits may stress fish sufficiently to predispose them to parasitic infestation. The current study was planned to investigate the role of different environmental changes in pond water on the occurrence of an outbreak of *lerneasis* among carp fish, beside studying the hygienic and control measures adopted to eradicate such problem.

MATERIAL AND METHODS

This study was carried out during the period from June to late September 1997 on fresh water fish (*Cyprinus carpio*) which is commonly named common carp of different weights and sizes. The fishes were reared in ponds of conservation reservoir 10 x 6 x 3 meter belonging to Faculty of Veterinary Medicine, Suez Canal University at stocking rate 30.0 gm/liter. The pond takes its water from Ismailia Canal, the flow rate of aquarium water through the filter at inlet of pond was approximately 1.9 liter/minutes and the capacity of water in pond was nearly 130 m³.

Pond was fertilized every 2 weeks with chicken manure, superphosphate and urea. Fish

were fed 30-35 kg/pond/day commercial concentrate mixture (17.45 % protein) 6 days/week.

A case history.... A outbreak of ectoparasite infestation among carp fish in pond were reported. The main complain was high morbidity rate among carp fish in the pond. Affected fishes showed nervous manifestation, loss of balance, swimming near the surface and rubbed their bodies against fixed objects in pond.

A total number of 100 diseased fish were caught and subjected to full clinical and parasitological examinations according to the methods adopted by Anlacher (1970) and Lucky (1977).

I- Parasitological examination:

The affected parts of the external body surface of naturally infested fish were carefully examined by the naked eyes. The parasites were collected by fish brush and washed for several times in saline solution and left in the refrigerator for relaxation. The collected crustacea were fixed in Formalin solution 3 % and preserved in alcohol glycerine permanent mounts were prepared by the passage in ascending grades of alcohol, cleared in glycerine and mounted in glycerine-gelatin (Lucky 1977).

Collection of water samples. A total of 48 water samples were collected from the pond, divided equally (n = 16) on 3 stages, the first during an outbreak then before and throughout the period of treatment of *lernea* infestation. Samples were collected at early morning as technique described by APHA 1985. Each sample was ob-

tained from at least 3 different sites of the pond in clean, sterile and colourless glass bottle of one liter capacity by holding the bottle from its bottom and dipped into the water through an inverted position which after being deep enough below the surface, the stopper was removed by other hand, the bottle was turned up carefully and stoppered under the surface of water. The labelled bottles were dispatched at 5°C to the laboratory with minimum of delay for physical and chemical examination.

II- Physico-chemical examination of water- was carried out according to the technique adopted by APHA (1985).

- A- pH value- was determined by the glass electrode method.
- b- Temperature and Dissolved oxygen were measured by means of an oxygen meter YSI model 57.
- c- Turbidity was measured according to the nephelometric method.
- d- Chemical analysis. Ammonia and nitrite were measured using Nanocolor test kites (Machery-Nagel GmbH and Co.KG)

III- Field studies on control of *lernea* outbreak in carp fish.

1- Strict hygienic measures adopted before application of chemotherapy include :

- Hygienic removal of dead carp fish, Reduction of stocking density to 20.0 g/L by fishing about 10 % of main stock, Siphoning of most of organic matter found in the bottom of pond, Replacement of about half the water volume found in the pond daily accompanied with in-

creasing the rate of flow of water at inlet to 3.2 liter/min, Check the screen of water inlet and repairing it and Using of cows manure as fertilizer instead of chicken manure to decrease pH.

Physical and chemical parameters of water in ponds were adjusted and fixed throughout the period of treatment through the application of hygienic measures previously mentioned.

2. Chemotherapy. two drugs were subsequently used:-

- a) Metrophonote (organo-phosphorous compound) was obtained from ADWIA pharmaceutical Company, 10th Ramadan, Egypt.
- b) Potassium permanganate was obtained from El-Nasr Co, Egypt.

The treatment of carp fish using static procedure was established by measuring the volume of water and fish in the pond to calculate the required concentration of Metrophonate and potassium permanganate was 0.25 mg/L & 25 mg/L respectively. Treatment was applied at early morning to avoid the time of elevated temperature (Schaperclaus, 1992). Fishes were fasted for 24 hr prior to the treatment (Roberts and Shepherd 1974). Immediately after the time of treatment, pond water was removed and replaced with fresh water.

First treatment.. Metrophonate in solution was evenly spread over the surface of water in pond to give final concentration 0.25 mg/L for 1 hour daily for 7 successive days as described by In-

tergasser, (1989) after that, the pond was kept for 3 days without any treatment then freshly prepared potassium permanganate solution was spread evenly in small quantities over the water surface during a 15 minute period. This process was repeated again after one hour to give final concentration 25 mg/L followed by addition of running fresh water and continuous draining according to Sarig (1971).

3) **After chemotherapy..** At the end of the treatments previously described, a total of 500 apparently healthy, *O. niloticus* fish (Nile Bolti) were procured from fish laboratory center at Abbasa, Sharkia Governorate and added to the main stock of carp. Statistical analysis were done according to Snedecor and Cochran, 1989.

RESULTS

Obtained results are recorded in Tables 1, 2, and 3.

Table (1): Physico-chemical analysis of water in pond during outbreak of Lereanesis

Parameter	pH	Temperature °C	Dissolved oxyge (Do)	Turbidity NTU	Ammonia ppm	Nitrite ppm
Mean	9.08±0.43	30.0±1.5	2.33±0.24	285.9±7.66	0.11±0.013	0.175±0.15

Table (2): Physico-chemical analysis of water (Adjusted) in pond before and throughout the period of treatment.

Parameters	pH	Temperature °C	Dissolved oxyge (Do)	Turbidity NTU	Ammonia ppm	Nitrite ppm
Mean ± S.E	8.3±0.33	25.5±1.6	4.08±0.35	142.0±6.3	0.068±0.013	0.054±0.006

Table (3): Results of treatment approach to lerneia infestation in carp fish

Chemotherapy Percentage	Before treatment	After treatment with		
		Metrophonate 0.25 mg/L for 7 successive days	25 mg/L for one hour/one day	Mono sex Tilapia (<i>O. niloticus</i>) (500 Fishes)
Lerneia infestation	80	30	10	5
Reduction in parasitic infestation	0	62.5	66.6	50

DISCUSSION

Ectoparasites are important limiting factor in the development of intensified fish culture. The present investigation dealt with the most dangerous one, the copepode crustacean lernae, which is considered the most largest parasite infesting the external body surface where it ingests destroyed cells of the host as well as tissue fluids and blood producing characteristic lesions represented as focal haemorrhage by the anchor (Joy and Jones 1973, Reichenbach - Klinke, 1973 and Stoskopf 1993).

Parasitological examination revealed high incidence of ectoparasite infestation in carp fish up to 80 %, the crustacean copepode was identified as lerneae elegans. The description of this parasite was similar to the description given by Post (1983); Schaperclaus (1992) and Egusa (1992).

Concerning the physical and chemical parameters measured for water in pond at risk time of infestation (Table 1) showed that the mean values of pH, temperature, dissolved oxygen and turbidity were 9.08 ± 0.43 , 30.0 ± 1.5 , 2.33 ± 0.24 mg/L and 285.9 ± 7.66 NTU respectively. On the other hand the mean values of ammonia and nitrite were 0.1 ± 0.01 and 0.175 ± 0.015 ppm respectively. The mean values of the different water quality parameters were relatively high but did not reach harmful level. The high percentage of lerneae infestation (80 %) may be attributed to increase stocking rate, organic matter, and relatively high water temperature in pond particularly during summer season which

favour the propagation of lerneae agents which use the fish as substrate for attachment. These results in agreement with Roberts (1989) who reported that the optimum temperature for lerneae occurrence between 22-30°C, Meanwhile, Noga (1996) concluded that with higher stocking rate, water quality problems due to low oxygen level, high ammonia and nitrite concentrations were more frequent and further magnified during the period from June to August when water temperature is highest and solubility of gases is lowest which may stress fish sufficiently to predispose them to parasitic infestation.

The mean values of the different water quality parameters before and throughout the period of treatment were recorded in table (2) 8.3 ± 0.33 , 25.5 ± 1.6 , 4.08 ± 0.35 and 142.0 ± 6.3 NTU for pH, temp, dissolved oxygen and turbidity respectively meanwhile, the mean values for ammonia and nitrite were 0.068 ± 0.013 and 0.054 ± 0.006 ppm, respectively, lowering the mean values of different water quality parameters as compared with those recorded in table (1) may be attributed to strict hygienic measures adopted in pond before and throughout the period of treatment including hygienic removal of the dead fishes from this pond due to the fact that these fishes act as a source of infection to other fishes in pond (Kubata 1970). The reduction of stocking density of carp fish in pond minimizes the risk of overcrowding as stress factor, reduce the amount of organic matter produced and also harbour crustacean parasites which in turn improve the respond of carps to applied treat-

ments (Egusa 1992), check of the screen at the sites of water inlet as it may introduce some fish enemies such as harmful crustacea and organic matter into pond (Sinha and Romachandram, 1985). The replacement of about half the water volume before and during periods of treatment is essential to decrease the temperature of water pond and decrease the load of organic matter and harmful impurities which consequently increase the rate of dissolved oxygen in pond water and minimize the extent of stressors (Shepherd and Bromage, 1988). The siphoning of the organic matter accumulated at the bottom of pond was carried out as it acts as reservoir for parasitic agents and interfere to suppress the effectivity of potassium permanganate used for treatment (Kubata 1985). This explains the importance of fasting of fishes before and during the period of treatment, thus to avoid an increase the load of excreta and organic matter produced in pond (Egusa, 1992).

Results in table (2) revealed that treatment by Metrophonate succeeded in reducing the percentage of infestation among carp fish in pond by *lernea* from 80 to 30 % with a reduction percentage 62.5 %. This may be attributed to high efficacy of metrophonate against different copepoidal stages of *lernea*, which reduced the rate of new infestation in the same fishes and other fishes in ponds. Subsequently decreased morbidity rate among infested fish (Intergasser, 1989 and Schaperclaus, 1992). On the other hand, the use of potassium permanganate succeed in reducing the infestation rate from 30 to 10 % with reduction percentage 66.6 %. This may be attributed

to high efficacy of pot. permanganate against adult females of *lernea* anchored in the external body surface of carp fish (Schaperclaus, 1992). Using of pot. permanganate in the early morning may be attributed to its photolability in direct sunlight and rapidly loses its effectiveness against parasites.

Concerning the addition of monosex Nile Bolti (*O.niloticus*) to the main stock of carp in pond. This attributed to the fact obtained by researchers referring to that carp fishes when reared in a pond with Nile Bolti became less susceptible to parasite infestation as compared with those reared alone (Kubata, 1985). Our findings support this fact as the obtained results indicated reduction of percentage of infestation among carp fish from 10 to 5 % with reduction 50 %.

From the present study, it can be concluded that physical and chemical examination of water in ponds must be done regularly to monitor its availability for fish rearing besides rapid removal of any harmful impurities which acts as environmental stressors that predispose to infection, also, regular inspection of fishes in pond for early detection of ectoparasite infestation and application of appropriate treatment. On the other hand, strict prophylactic hygienic measures must be adopted before and during summer season as rising of temperature during this period favour the propagation of parasitic agents and increase rate of infestation.

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