

Combined Prophylactic Drug Treatment and Balanced Diet in Rearing Fry of the Indian Major Carp *Labeo rohita*

B.K. MISHRA, D. KUMAR and R.K. DEY

Unit for Ichthyopathology and Fish Health Protection
Central Institute of Freshwater Aquaculture
Central Inland Fisheries Research Institute
P.O. Kausalyagang, Via. Bhubaneswar
751002 (Orissa), India

Abstract - In a large-scale field experiment the influence of prophylactic antibiotic treatment and of balanced feed in the nursery rearing of Indian major carp postlarvae, *Labeo rohita* (Ham.) was tested. The results indicate that under the conditions of the experiment, a two-hour prestocking treatment of postlarvae in an antibiotic solution containing 50 mg l⁻¹ of oxytetracycline increased survival by about 40%. Survival was increased by over 80% by feeding a balanced diet fortified with vitamins, minerals and trace elements (composition: protein 40%, carbohydrate 18%, fat 7%, fiber 20% and ash 15%). Survival of fry which received both the prestocking antibiotic treatment and the formulated diet was about 116% higher than that of the control group.

High rates of mortality and poor growth during larval rearing operations are sometimes caused by malnutrition and bacterial attack. Sen and Chatterjee (1979) observed that the survival and growth of Indian major carp fry can be enhanced significantly by addition of cobalt chloride and to a lesser extent by starch, boron and manganese to the feed. Das (1959, 1960, 1967) and Das and Krishnamurthy (1959) observed that minute quantities of vitamin B-complex and yeast significantly enhance the survival of Indian carp fry.

Recently, Kumar et al. (1986) reported that stress caused by handling and transporting rohu, *Labeo rohita* (Ham.) could trigger outbreaks of columnaris disease. Bejerano et al. (1979) reported considerable reduction in losses by more careful transportation of fish

and prophylactic bathing in an antibiotic solution before or during transportation.

The work reported here was taken up to study the relative usefulness of prophylactic drug treatment and the influence of improved food quality for increasing the survival in fry nursing operations.

Three-day-old rohu (*Labeo rohita*) postlarvae obtained from induced breeding were measured and divided into four groups. For each group three replications were made. The postlarvae of groups A and D were given a 2-hour prestocking prophylactic antibiotic bath in a solution containing 50 mg l⁻¹ of oxytetracycline while those of groups B and C did not receive this treatment. The postlarvae were then stocked at the rate of 5,000,000 ha⁻¹ on a random selection basis in 12 adjacent 0.01-ha nursery ponds having more or less similar ecological conditions. Postlarvae of groups A and C were fed the conventional feed, groundnut oil cake + rice bran in 1:1 ratio, while fry of groups B and D were fed a formulated balanced diet (composition of the feed: protein 40%, carbohydrate 18%, fat 7%, fiber 20% and ash 15%) fortified with vitamins, minerals and trace elements, i.e., multivitamins 0.1%, calcium dibasic phosphate 1.1%, NaCl 0.3%, and trace elements 0.1%. The quantity of supplementary food provided each day for the fry was equivalent to the initial weight of fry. The food was given in feeding trays kept in the ponds. Plankton was collected at dawn by taking samples from five different places in a 10-l bucket and filtering them through a bolting silk (No. 20) net, having 70 meshes per cm. The filtrate was preserved immediately in 4% formaldehyde. Plankton was collected twice, i.e., at the beginning and at the end of the experiment. After 15 days the fry were harvested.

Table 1 shows the details of average weight increment and survival of fry at the conclusion of the experiment. There were significant differences in survival between all groups. Survival was lowest in the control group C. Antibacterial treatment prior to stocking increased the survival by about 40% in group A, while feeding with the fortified balanced diet increased the survival by over 80% in group B as compared to the control group C. In group D, which received both prophylactic antibacterial treatment and fortified balanced diet, the survival was about 116% higher than the control group C.

The analyses of variance showing the significance of growth increment and survival of fry are presented in Tables 2 and 3,

respectively. There were significant differences among the different treatment groups ($P < 0.01$) but no significant differences were observed between the three replications ($P > 0.05$).

Table 1. Average weight increments and survival of fry of *Labeo rohita*.

Group	Mean*	
	Weight (mg)	Survival (%)
A	125.53 ^b	15.76 ^b
B	123.16 ^b	20.28 ^c
C	139.86 ^a	11.23 ^a
D	114.63 ^c	24.31 ^d

*In a column, means followed by a common letter are not significantly different at 5% level using Duncan's multiple range test.

Table 2. Analysis of variance table showing the significance of growth increment of fry.

Source variation	Sum of squares	Degrees of freedom	Mean square	F value
Treatment	988.71	3	329.57	18.73**
Replication	107.05	2	53.53	3.04 ^{ns}
Error	105.58	6	17.60	
Total	1,201.34	11		

** Significant at 1% ($P < 0.01$).

^{ns} Not significant ($P > 0.05$).

Table 3. Analysis of variance table showing the significance of fry survival (%).

Source of variance	Sum of squares	Degrees of freedom	Mean square	F value
Treatment	287.46	3	95.82	26.40**
Replication	20.20	2	10.10	2.78 ^{ns}
Error	21.77	6	3.63	
Total	329.43	11		

** Significant at 1% ($P < 0.01$).

^{ns} Not significant ($P > 0.05$).

The average plankton density in the ponds at the beginning of the experiment was 0.0056 ml l⁻¹ and was almost negligible at the end of the experiment. The dominant zooplankters were *Cyclops*, *Diaptomus*, *Moina*, nauplii and *Brachionus*. Phytoplankters, namely *Scenedesmus* and *Oscillatoria*, were present in negligible numbers.

The pH of soil and water of the ponds ranged from 6.2 to 6.8 and 7.0 to 7.7, respectively. Ranges of alkalinity, phosphate (P₂O₅), ammonia and nitrate in the ponds were 50-60 ppm, 0.04-0.1 ppm and 0.05-0.1 ppm, respectively.

Acknowledgements

The authors express their sincere gratitude to Dr. A.V. Natarajan, Director, Central Inland Fisheries Research Institute, Barrackpore; and Dr. V.R.P. Sinha, National Project Director and Officer on Special Duty, Central Institute of Freshwater Aquaculture, Kausalyagang, Bhubaneswar, for their valuable suggestions, keen interest and encouragement. We also wish to express our sincere thanks to Mina Soriano (ICLARM), who provided statistical advice.

References

- Bejerano, Y., S. Sarig, M.T. Horne and R.J. Roberts. 1979. Mass mortalities in silver carp *Hypophthalmichthys molitrix* (Valenciennes) associated with bacterial infection following handling. *J. Fish. Dis.* 2:49-56.
- Das, B.C. 1959. Comparative effect of vitamin B₁₂, cobalt nitrate and ruminant stomach extract on the survival rate of Indian carp during first three weeks of life. *Indian J. Fish.* 6(1):211-221.
- Das, B.C. 1960. Effectiveness of yeast, vitamin B₁₂ and alternative treatments on survival of Indian carp during the early period of life. *Can. J. Biochem. Physiol.* 38:453-458.
- Das, B.C. 1967. Effect of micro nutrients on the survival and growth of Indian carps fry. *FAO Fish. Rep.* 44(3):241-256.
- Das, B.C. and H. Krishnamurthy. 1959. Comparative effects of yeast vitamin B-complex and vitamin B₁₂ on the survival rate of Indian minor carp during first two weeks of life. *Proc. Nat. Inst. Sci. India* 25B(6):300-306.
- Kumar, D., K. Suresh, R.K. Dey and B.K. Mishra. 1986. Stress mediated columnaris disease in rohu *Labeo rohita* (Hamilton). *J. Fish Dis.* 9:87-90.
- Sen, P.R. and D.K. Chatterjee. 1979. Enhancing production of Indian major carp fry and fingerlings by use of growth promoting substances, p. 134-140. *In* T.V.R. Pillay and W.A. Dill (eds.) *Advances in aquaculture*. Fishing News Books Ltd., Farnham, Surrey, England.